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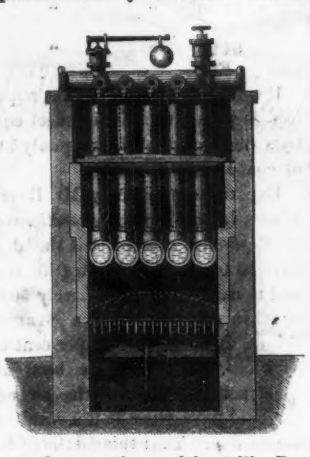
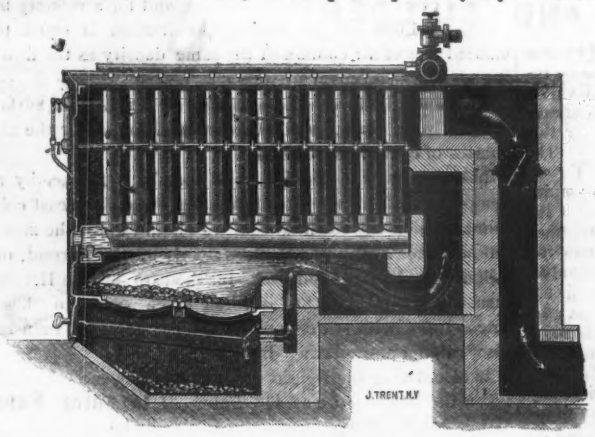
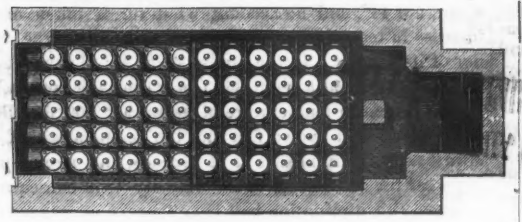
HOWARD'S SECTIONAL BOILER.

A steam boiler safe against explosion is not only a great desideratum to all those directly interested in the use of steam power, but scarcely less so to the public at large, for the fearful loss of life and great destruction of property occasioned by boiler explosions are by no means confined to those directly interested in their use, as every person's life, and a large amount of property are more or less exposed to this danger. In all of our cities and towns, steam power is used, not only in buildings crowded with operatives, but it is frequently placed contiguous to public streets, and not unfrequently the sidewalks and even carriageways of great thoroughfares like Broadway are honeycombed by vaults containing these unseen dangers. The number placed under streets and sidewalks in New York alone may be counted by hundreds, and these may at any time, through the defect of a plate, or the inattention of a fireman, explode, to the injury or destruction of many unconscious victims. To render the great power of steam more generally useful as a servant, and at the same time to effectually curb and control its destructive tendencies is the object of the HOWARD Sectional Boiler. This boiler, illustrated in the accompanying engravings, is now being extensively used in England, having been successfully introduced there about three years ago. Its chief characteristics are perfect safety from dangerous explosion, great economy in the use of fuel, durability, smallness of space which it occupies, the ease and facility with which it may be transported, the simplicity of all its parts, the readiness with which it may be cleaned both inside and out, the inexpensiveness and facility of making such repairs as may be necessary, the rapid and uniform circulation of water, and its regulated method of superheating steam. This boiler is constructed of horizontal and vertical tubes, and so connected that expansion or contraction will not strain it. Within each vertical tube is a smaller tube, so placed as to cause a rapid and uniform circulation of the water and prevent incrustation. The importance of this will be appreciated in view of the great number of boilers which are injured or destroyed through the effects of incrustation alone. There are openings through the feed-pipe into the horizontal tubes, covered by removable caps, through which a scraper may be introduced to remove any sediment that may be deposited there. Through the doors in the boiler front the soot is easily removed from the outer surfaces of the tubes. By these means, it will be seen, the boiler may be kept perfectly clean, both inside and out. The volume of flame and heated gases strikes most of the heating surfaces at right angles, and thus communicates its heat most effectually to the water and steam. Tested by the pyrometer, the heated gases, as they pass into the chimney, are found to be but little above the temperature of the steam in the boiler, and as the smoke is very effectually consumed, the utilization of the heat is rendered almost complete. In the manufacture of this boiler, each tube is subjected to a pressure of 500 pounds to the square inch before being placed in its section, and the sections, when put together, are tested with the same pressure. They are, however, capable of withstanding a much higher pressure. Their great strength is an assurance against bursting; but, should one of the tubes give way, no dangerous explosion would ensue. The sections being connected only by small tubes, each section is virtually an independent boiler, and the rupture of a tube would be like opening a large steam valve into the fire-chamber. This boiler may be set up or repaired by any ordinary mechanic, requiring no higher mechanical skill than to set a gas pipe. Any tube may be removed and another substituted, with but little delay or expense, thus rendering repairs easy and inexpensive. This boiler occupies much less space than most other boilers now in use. The sections of which it is composed are light, and easily transported on the backs of mules over bad roads or difficult mountain passes, and the different parts will readily pass through ordinary doors or windows, rendering it unnecessary, in placing it in position, to disturb the walls of buildings. The heaviert parts can be handled by two or three men. As the upper parts of the vertical tubes are used for superheating the steam. The superheating chamber may be increased or diminished at pleasure, by raising or lowering the water line in the boiler, and thus the steam can be superheated to any desirable extent. A thirty horse power boiler may be seen in operation at the works of MORRIS, TASKER & Co., in Philadelphia. Full information relating to this boiler may be obtained, and models and drawings seen at the office of AUSTIN & GERMAIN, 37 Park Row, New York City.







HOWARD'S SECTIONAL BOILER.

Fire-Proof Flooring.

We read, in a French newspaper, of recent date, of a very simple way of making a fire-proof flooring, which is applicable to warehouses and granaries. It consists in first spreading upon the planks a layer of clay about one inch in thickness, and running upon this a layer of asphalt about half an inch thick. Numerous experiments, it is stated, have proved the efficacy of this as a protection against the spread of fire, and it has been adopted in all the corn stores of the General Omnibus Company of Paris.

Improved Pump.

The pumping apparatus represented in the engravings has been designed not only to meet the requirements involved in the employment of this class of mechanism, but also to meet in an especial manner the wants of distilleries, breweries, and other establishments where it is necessary to raise comparatively thick and heavy liquids, and also those situations where, as is often the case in the West and South, the water is muddy, and consequently liable to derange the parts of an ordinary pump. The construction of the improved machinery for the purpose indicated, as well as its mode of operation, will be understood from the description, having reference to the cuts, in which Fig. 1 is a perspective and Fig. 2 a vertical transverse section of the apparatus. It will be noticed that the construction of this pump is radically different from the pumps now in use. The outer shell, A, is a cylinder sufficiently enlarged to admit the cylinder, B (in which the piston travels) within it—thus making a cylinder within a cylinder—and that it projects beyond cylinder B, so as to allow a large opening for the free passage of liquid. The space between the two cylinders is designed for a receiver, in which to allow all gravel and similar substances to settle, keeping them from coming in contact with and injuring the working parts of the pump—and which can be removed through a hand hole. Above the cylinder, A, are two chambers, D, between which is situated a rectangular case, divided into two compartments by a horizontal partition. With the upper compartment communicates the inlet-pipe or passage, F, and with the other compartment communicates the outlet-pipe or passage, indicated in dotted outline at G. The upper compartment has, furthermore, two valves, *c*, opening outward, while the lower compartment is furnished with two similar valves, L, opening inward. Arranged above the case just described is an air-receiver, E, which by means of a passage, furnished with valves as hereinafter more fully expressed, communicates with the chambers, D. It should also be mentioned that in addition to the parts above described the pump

Fig. 1

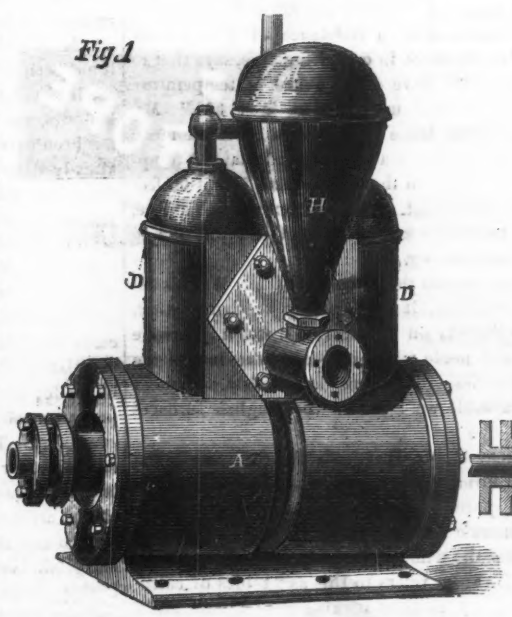
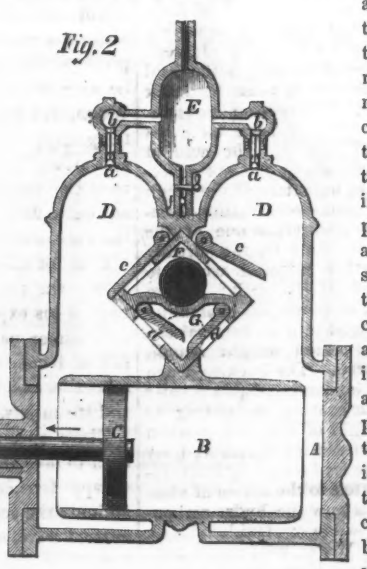


Fig. 2



FRYER'S IMPROVED PUMP.

is fitted with the usual air-chamber, H. As the piston, C, moves in one direction, the water or other liquid from the inlet-pipe, F, is forced by the pressure of the atmosphere into the upper compartment of the case, and lifting one of the valves, *c*, passes into the adjacent chamber, D, and that portion of the cylinder, B, behind the piston. Any air that may be introduced mechanically with the liquid rises, by its lighter gravity, and passing between a valve, *a*, and the seat below which it is arranged, lifts another valve provided at the upper end of the stem of the valve, *a*, and passes first into the air-receiver, E, and then from the latter through an outlet-pipe provided in its top. Should any of the liquid be carried over into the air-vessel, it may either be withdrawn from the bottom of such vessel at appropriate intervals by a stop-cock, or it may be suffered to escape continually therefrom, as may be desired. Simultaneously with the entrance, as just described, of the liquid behind the piston, that in front of the latter, lifting one of the valves, L, passes directly to the outlet pipe, the passage of the liquid to the air-receiver, when thus subjected to the pressure of the piston, being prevented by the forcing upward of the adjacent valve, *a*, to its seat by the pressure of the liquid. In the reverse movement of the piston the operation is of course the same, the valves raise during one movement of the piston, being closed during the other, and *vice versa*. The air-receiver, E, is only used when valuable liquids are being pumped, so that in case any should pass valves *a* and *b*, it can be secured in the receiver—where water or other liquids of little or no value are being pumped the receiver, E, is not necessary, as the valves will sufficiently prevent its passage. Attention is also called to the construction and arrangement of the valves. The valve seat is a metal block, diamond-shaped, fitted tightly to its place. The inlet-valves, *c*, open into the upright chambers—and the outlet-valves, *d*, open outward, into the diamond—a bonnet is bolted on, as shown in Fig. 1. To get at the valves it is only necessary to remove the bonnet—and any or all of them can be removed and new ones inserted without disturbing the valve-seat. When necessary, the rest can be taken out and returned without difficulty. Among the adantages claimed for this pump by the inventors may be named the following: The piston being submerged and the liquid always filling the entire pump, no space is afforded for the collection of air, which might otherwise interfere with the proper operation of the parts, and any air that may find its way into the pump rises to the top of this liquid and passes off through the air-receiver, which allows it a free passage, but by means of the valves conflected with such receiver closes as soon as the air has passed out, thus separating the air and liquid, so that each has its own outlet, and a continuous stream of the liquid is ejected from the pump. Furthermore, the main or inlet and outlet valves are very easy of access when desired. The parts or passages may be made of sufficient size to obviate any danger of clogging from the introduction of foreign substances, and the space allowed below the level of the cylinder receives any gravel or similar materials that may find their way into the pump, and thus prevents the same from interfering with the action of the apparatus. These pumps are manufactured and sold by Messrs. FRYER BROTHERS, Nos. 8 and 10 Wall street, Rooms No. 43, 45 and 47, New York City, to whom all orders may be addressed.

How White Lead is Made.

White lead is produced by exposing thin sheets of shapes of blue lead to the fumes of vinegar. The metalic lead is melted in iron kettles and run into moulds or shapes, called buckles, the buckles being about the size of small tea plates, the object being to expose as much of the metal as possible to the action of the vinegar. The buckles are placed in earthern pots, glazed on the inside, along with a quanity of whisky or molasses vinegar, or other acetic acid. The pots, thus charged, are placed in a bed of tan bark, the refuse of the tan yard. The first layer is covered with boards, on which is placed another and thinner layer of tan, and again a layer of pots, and so on, alternate layers of tan and pots, until the stack or kiln is completed. On the top of all is placed a thick layer of tan, and the process of converting the metal into white lead may be said to have commenced. The tan generates sufficient heat to vaporize the acid, which, coming in contact with the metal changes the same by a mysterious chemical process into a white brittle substance, which, with crushing and grinding, becomes the white pigment known as white lead. The process of disintegration and conversion goes on for eight or ten weeks, when the stack or kiln is ready to be taken down. The pots on being uncovered contain no acid, and the buckles have increased materially in thickness, bulk and weight. The acid, at first cold and inactive, warmed into life by the self-generating heat of the surrounding mass, has attacked the tough and ductile metal, destroying its metallic structure, forming new combinations, into which it enters as one of the component parts, adding weight and bulk to the already heavy substance, and bringing forth a material which, to the eye, offers no sign of the secret of its birth. During the process, the tan will have lost its power of generating heat, the acid will have been resolved into its original elements, and the buckles, with their added weight remain to pay the cost of labor and material. The buckles, when taken from the pots, are found to be encrusted to a greater or less extent with a white, brittle coating amounting to two-thirds or three-fourths by weight of the buckles when first placed in the pots. This encrustation is removed by pounding, and that portion of blue lead remaning is returned to the pots, to be again submitted to the action of vinegar and heat. The crust, which is now the hydro-carbonate of lead, composed in parts as follows: Oxide of lead, 86,377; Carbonic acid, 11,310; Water, 2313; total 100,000; is thoroughly washed, to free it from strains arising from whatever cause, and then crushed and ground in water, between heavy mill-stones, into a fine, pasty mass, which is conveyed to a stack or series of steam tight hollow pans placed one above the other, the upper surfaces of which are composed of sheets of copper riveted together to form continuous plates. Into the hollow of these pans, the exhausted steam from the engine is introduced, and the white lead is thoroughly dried. It has now become the dry white lead of commerce, and is ready to be made into paint, simply by mixing with linseed oil in the proportion of about nine pounds of oil to one hundred pounds of lead, and again grinding in heavy stone mills.—*Ex.*

Practical Letters.

[WRITTEN FOR THE AMERICAN JOURNAL OF MINING.]

THE "USEFUL EFFECT" OF MINE VENTILATORS.—No. III.

BY R. P. ROTHWELL, MINING ENGINEER.

The quantity of air circulated per pound of coal consumed or per horse-power utilized depends above all on the sectional area of the air courses, and is in itself *no criterion whatever* by which to judge of the efficiency of the ventilator, whether it be furnace or fan; though even if it were, mechanical ventilators would be found—as in the examples cited by me—to surpass the furnace. Mr. HARDEN uses this as his test of efficiency in the examples of furnace ventilation. He has taken no account of the pressure or drag on the air, nor of the barometric pressure, etc. In fact, in nearly all the instances recorded by Prof. PHILLIPS, Mr. MACKWORTH and Mr. WOOD, the water-gauge readings are not given. With the volume of air, the sectional area and length of the air courses given, we can, of course, obtain approximately the amount of work done, by applying such a general rule as the following:

"For every foot of rubbing surface, and for a velocity in the air of 1,000 feet per minute, the friction is equal to 0.26881 feet of air column of the same density as the flowing air."

The above is the co-efficient found by PECLET for surfaces of "burnt earth," while GREENWELL found for the air courses of coal mines 0.25436.

In estimating the effective work done by a furnace by a comparison of the weights of the upcast and downcast columns, it is clearly essential that we should know the *mean* temperatures of the two shafts, velocity of the current, or volume of air circulated, etc. In the case of the Hetton furnaces, Mr. HARDEN has devoted much space to these calculations, with scarcely more felicity, however, than in his "rule for assimilating drags."

In calculating the weight of air in the downcast, he has taken the temperature of 44°, Fahr. If he refers to Mr. WOOD's table of experiments, to which he has alluded, he will find the "mean temperature at the surface" was 48°, Fahr., not 44°, and no account whatever is taken of the increase in temperature of the air in descending the shaft, nor of its density. In the upcast shaft, Mr. HARDEN takes the temperature at a point 330 feet "from the bottom," or 130° as the mean temperature of an upcast 900 feet deep, while it is a well known fact that the temperature of the upcast rapidly diminishes as it ascends, and more especially near the surface where the velocity is in consequence reduced, this diminution had been found on another occasion to attain 1°, Fahr., for every 12 feet in height of this shaft for 300 feet from the surface down. These erorrs make the weight of the downcast too great, and of the upcast too little, with too great a velocity, and consequently the horse-power utilized is too great; this is given (AMERICAN JOURNAL OF MINING, Vol. VI., page 82), as 75 3-4, while (on page 98), "the practical working effect" expended in doing the same work is given as 122 horse-power! In the case of "Natural Ventilation" at the Hetton Colliery, to which I alluded, 127,000 cubic feet per minute was circulated under a resistance of 0.55 inches water gauge. Mr. HARDEN, in criticising this, says that to produce this "we must have a difference of temperature between the downcast and upcast of at least 35°." Mr. WOOD, in his report on these experiments, gives the mean temperature of the downcast at 44.12°, and that of the upcast at, say 72°, or 68.5° in the returns, and 75° at 60 feet from the top of the upcast. The difference is, therefore, not quite 28°. Doubtless a small part of this was due to the heat of the shaft-lining.

I do not wish to defend the accuracy of Mr. WOOD's results. On the contrary, it can scarcely be denied that, though his experiments on furnaces and steam jets were very numerous and made with great care, the results are full of inconsistencies. They are, nevertheless, the most extensive and valuable we have on the English furnaces and steam jets.

These specimens of Mr. HARDEN's figuring, as applied both to fans and furnaces, render it unnecessary for me to occupy further space in reviewing his examples. In noticing the economic limit of the furnace in a former letter, I gave, over the name of M. BURAT, a table to illustrate this. Mr. HARDEN refers to this as "tables of calculations published by mathematical authors," and adds, with characteristic modesty, "but I will put the matter in a practical shape." Had Mr. H. ever seen the works of the "mathematical author," M. BURAT, he must have noticed that they (*L'Exploitation des Mines* and *Materielle des Houilleres*) do not contain, from one end to the other, a single mathematical formula. It would be difficult to find a more thoroughly "practical" man than the distinguished French engineer. The "table" was also "practical," being the result of experiments on a number of furnaces. Mr. HAMAL, in his work on ventilation, after discussing at length the work done by a number of furnaces, given for the most part in experiments made by M. GLEPIN, concludes as follows:

"1st. The ratio of useful effect to heat expended in a shaft decreases as the temperature increases. Taking the depth of the shaft as 100 metres, the duty is but 4.1 per cent. in summer and 5.2 per cent. in winter. If the temperature is 200° C. (324°, Fahr.), with it is 10.71 per cent. in summer and 18. per cent. in winter; if the temperature is only 40° C. (104°, Fahr.), about the temperature which produced the maximum of draught in these experiments.

"2d. This ratio increases directly as the depth of the shaft. This depth would be 800 metres in the least favorable condi... the most favorable, in ...ed might equal that which a ma... ...g only 5.6 horse-power per pound of coal per minute can receive from the heat expended," etc., etc.; and he adds the following

"Table showing the useful effect of the furnace, or the percentage of work utilized which the heat developed could transmit to an engine utilizing 5.6 horse-power:

5.35	per cent.,	with a shaft	164	feet deep.
10.70	"	"	328	"
16.05	"	"	492	"
21.40	"	"	656	"
* * *			* * *	
64.20	"	"	1968	"
Etc.			Etc.	

It would, according to this, require a furnace shaft 2,000 feet deep to give a useful effect equal to a good fan driven by a steam engine utilizing only 5.6 horse-power per pound of coal burned per vein.

Experiments made by Mr. BATES, on a shaft in South Wales, in 1863 (*see Transactions of South Wales Institute of Engineers*) showed that the depth of the upcast would have to be about 800 feet (the temperatures of downcast and upcast being respectively 50° and 170°) in order to equal in effective work a STRUVE's ventilator (bell machine), utilizing only 38 per cent of the force applied to it by what appears to have been an engine of indifferent construction. Some of the large furnaces in the north of England have given better results; yet none have equalled a good fan. That this fact is at last becoming appreciated in England, is evidenced by the interest now being taken in mechanical ventilators, and the frequent substitution of mechanical ventilators for furnaces. A few weeks ago we noticed the introduction of a GUIBAL fan to replace the furnace at the Homer Hill Colliery in South Staffordshire, where 12 persons were killed about a year ago by an explosion of fire-damp. The account of the working of this fan says that it required only 20 seconds to increase the ventilation from a state of stagnation to that of 50,000 cubic feet per minute. There are now about 20 GUIBAL fans at work in England, besides LEMIELLE's, STRUVES', NIXON's and other ventilators.

The great expense in fuel of the furnace where a heavy drag has to be overcome, as stated in my former letters, is now being investigated in England; and not only does the consumption of fuel increase very rapidly when the heat of the upcast exceeds about 120° Fahr., but it has been abundantly proved by direct experiment that the temperature has but to be increased to from 420° to 600° Fahr. (depending in a measure on the size of the upcast), when an *absolute limit to the power of the furnace is attained;* for it has been shown that heated beyond *that* point the volume of air circulated or passed through the shaft *steadily diminishes*, and the maximum drag in the workings which has been overcome is about 13 lbs. per square foot, as I have already stated; while with most mechanical ventilators, though, of course, the useful effect diminishes as the air becomes more rarefied, an absolute limit has not yet been attained in experiments.

Every engineer acknowledges the desirability of having large air courses, and consequently large volumes of air at low velocities; in such cases with very deep and dry upcasts the furnace becomes, without doubt, a very efficient ventilator. It has long been as perfect as it probably can be made; and yet in economy it has proved unequal to our present mechanical ventilators, which are being improved every day. There can be little doubt, therefore, that the day is not far distant when ventilation by furnace will be counted "among the things that were." It has already almost arrived at that point in the practice of the German, French and Belgian engineers, with which practice I have had abundant opportunity to make myself acquainted. Perhaps some of Mr. HARDEN's prejudice against mechanical ventilators may be due to unfortunate "practical experience," as a lad in turning the "Blow George."

The economy of mechanical ventilators is by no means their only point of superiority to the furnace. Their greater efficiency and safety are equally, and in the case of fiery mines, much more important. There can be little doubt but that the explosion which caused the death of 62 persons only a few weeks ago in the Arley Pit, near Manchester, would have proved much less serious, or have been entirely prevented, had the ventilation been effected

by means of a good fan or air pump instead of the furnace. We are told that "some persons near the upcast shaft were burned, owing to the flames from the furnace having been driven along the workings." The "ventilation was reversed," and could only be righted, after the loss of much valuable time, by pumping water into the downcast shaft. After explosion, "most of the deceased had left their working places and were found in the main pony road along which they had evidently been trying to escape." Had the mine been ventilated by mechanical means such as we have described, capable of producing a current equal to 50,000 feet per minute in 20 seconds (like that at the Homer Hill Colliery), and of overcoming a heavy drag, as most mechanical ventilators are, no such "stagnation" could have happened, much less the reversal of the ventilating current; and this lamentable loss of life would doubtless have been prevented, or at least greatly lessened.

In noting the valuable assistance afforded by the waterfall, in this instance I may also correct a slight error which occurred in a paragraph on this subject in my former letters (p. 354, Vol. V.) The error consisted in the omission of *or* in the following sentence, and appeared to me at the time to be so *transparent* a typographical error as not to call for correction, while others, more important, though equally apparent, were allowed to pass. As it afforded Mr. HARDEN an opportunity to show the animus which pervades his criticism, it may be well to notice it here: "This method (waterfall) is applicable in many cases, especially where there is an abundance of pumping power, *or* with an outlet for the water by an adit-level"—the latter being a case not unfrequently met with in mountainous districts.

A correspondent of the London *Mining Journal*, refering to this explosion, says:—"The ventilating furnace in most instances of this kind is a standing source of danger. * * * The attempts to put out the furnace fire were ineffectual after the air current was reversed; and it was not got out until the current was changed again into the proper course. It seems almost providential that the coal was not ignited by the furnace, and many more lives sacrificed; as it was, we understand many were burnt, and probably some destroyed by the products of combustion, carbonic acid, etc., circulating in the return air sources inward and back by the intake to the downcast pit, while the air current was working the reverse way."

Accidents may of course occur even with abundant machine ventilation, as, for example, the explosion which occurred in the Pelton Colliery, which is ventilated by a GUIBAL fan; but it is now beginning to be conceded in England, and for many years has been acknowledged in France, Belgium and Germany, that the chances of explosions, as well as their seriousness when they do occur, are much less than when the ventilation is effected by the furnace. The unfounded prejudice which existed in England against mechanical ventilators, has, within the last few years, been much lessened. We find the English engineers now making the same experiments and obtaining the same results as induced the French and Belgian engineers, without exception, many years ago, to assert the superiority of the mechanical ventilator to the furnace. It would be easy to lengthen this paper indefinitely by quotations to this effect from COMBES' Mining, PONSON's Coal Mining, and the Supplement to the same; BURAT's Mining and *Materielle des Houillers*, HAMAL's Ventilation, JOCHAM, TRASEUSTER, FABRY, GLEPIN, GUIBAL and many others.

But not to prolong further these letters by quotations in confirmation of what I have advanced, I will close by giving the opinion of one of the first rational mining engineers in England, Mr. GEORGE ELLIOTT, the distinguished President of the North of England Institute of Mining Engineers. As he was formerly a strong advocate of furnace ventilation, this will also illustrate the change which is taking place in England on this subject. He states as his opinion that "the day is not far distant when furnace ventilation would be entirely superseded by the use of mechanical ventilation. He believed, moreover, by such appliances they would very much add to the safety of mining operations. He believed they [the members of the South Wales Institute of Engineers] could not do better than apply their minds to the inquiry whether they could not get rid of the dangerous, expensive, and old-fashioned system of furnaces in pits."

[CORRECTION.—In table near foot of first column, page 18, under Experiment No. 18, "Ratio of Useful Effect," for 37 1-2 per cent. read 73 1-2 per cent. Also line eleven in second column make the same correction. It will then read, "A ventilator which can utilize only 25 per cent. of the force applied to it, is nearly 15 per cent. more economical or better than one utilizing 73 1-2 (not 37 1-2) per cent. of the applied force." Also in table on first column, under Experiment 12, "Horse-Power Utilized per Pound Coal Burned," for 2.2, read 2.17.]

— About 4,500 work-people are engaged in the neighborhood of Dudley, in England, in the manufacture of chains, cables, and anchors. Over 60,000 tons of chains and cables, and 5,000 tons of anchors are produced annually.

LESSONS ON MECHANICAL DRAWING.
NO. XXIII.

BY T. P. PEMBERTON.

CONIC SECTIONS—THE ELLIPSE.

Conic Sections are the figures made by a plane cutting a cone. According to the different positions of the cutting plane there arise five different figures or sections, namely, a triangle, a circle, an ellipse, an hyperbola, and a parabola; the last three of which only are peculiarly called Conic Sections. If the cutting plane pass through the vertex of the cone, and any part of the base, the section will be a triangle. If the plane cut the cone parallel to the base, or make no angle with it, the section will be a circle. The section (Fig. 1) is an ellipse when the cone is cut obliquely

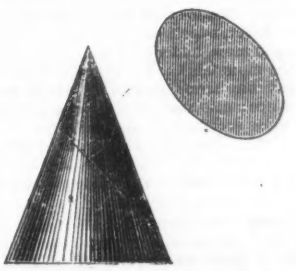


FIG. 1.

through both sides, or when the plane is inclined to the base in a less angle than the side of the cone is. The section is a parabola, when the cone is cut by a plane parallel to the side, or when the cutting plane and the side of the cone make equal angles with the base. The section is an hyperbola, when the cutting plane makes a greater angle with the base than the side of the cone makes.

The ellipse of a cone differs from the oval, which is obtained by an oblique section of a cylinder. The one is often confounded with the other. If the student will take the pains to make a wooden cone and then cut it entirely through in an oblique direction, he will find that the end of the cone nearest the base will be larger than the one which approaches the apex. The instruments known as elliptographs are used for describing ovals; in lesson No. 6 a patent oval compass was illustrated and described. Elliptical curves are generally found in Grecian mouldings and in monuments, architectural iron castings, frames of machines, etc. There are several methods of drawing ovals and elliptical figures. In all of the latter we find a long and short diameter, one of which is termed the "transverse" diameter or axis, and the other the "conjugate" diameter. The elliptical figure contains two points or centers in the transverse diameter, termed the "foci." These are at an equal distance from the conjugate diameter. The "center" of this figure is at the point of intersection of the two diameters. All lines drawn within the figure, parallel to one another, and bisected by a diameter, are called "ordinates;" seen in Fig. 3. When the transverse diameter is cut into any two parts by an ordinate, the parts are called "abscissa." Let it be required to draw an elliptical figure, having the two diameters given.

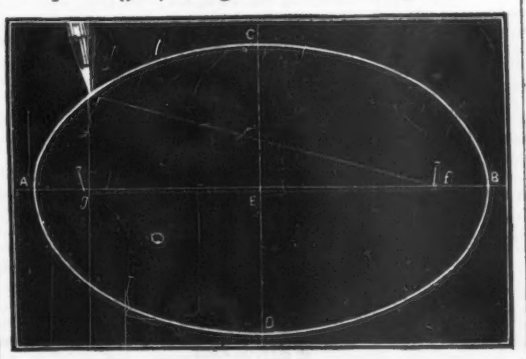


FIG. 2.

A, B is the transverse diameter, and C, D the conjugate diameter. Bisect A, B by a perpendicular, C, D, making E, C, E, D, each equal to half of the conjugate diameter; and from C, with a distance equal to A, E, mark off the points f, g, which are the foci; insert a pin at the points C, g, f, and fasten a strong but fine thread tightly around the pins; then withdraw the pin from C, and insert the point of a pencil or tracer in the loop of the thread, and carry this around, taking care to keep the thread always tight. This will make out the elliptical curve answering to the given diameters.

In order to construct an ellipse by ordinates, having the transverse and conjugate diameters given, divide the semi-transverse axis into ten equal parts, and draw ordinates. The length of these ordinates equals the semi-conjugate axis, multiplied by the respective numbers, as follows:

Ordinate.	Multiplier.
No. 1	1,000
2	.9949
3	.9797
4	.9539
5	.916
6	.866
7	.8
8	.7141
9	.6
10	.4358

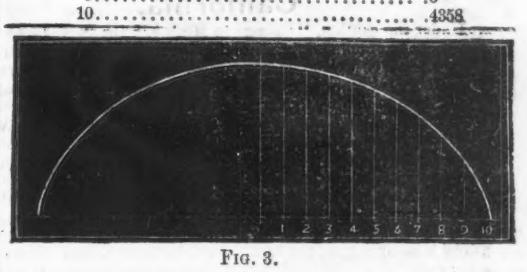


FIG. 3.

This is shown in Fig. 3, in which a number of ordinates, numbered 1, 2, 3, etc., are drawn. The different lengths of these ordinates will determine the elliptical curve.

To calculate the length of any ordinate

Let T=Semi-transverse axis,
C=Semi-conjugate axis.
k=The length of any ordinate,
X=Distance of the ordinate from the center.

$$k = \sqrt{C^2 - \left(\frac{C\ X}{T}\right)^2}$$

Divide the product of the semi-conjugate axis and the distance of the ordinate from the center, by the semi-transverse axis; subtract the square of the quotient from the square of the semi-conjugate axis, and take the square root of the remainder.

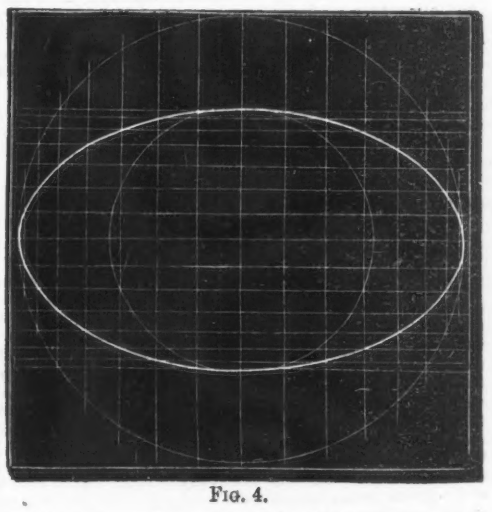


FIG. 4.

To draw an oval by means of the divisions of two circles having the length and breadth of the oval given.

Draw the large circle with a diameter equal to the major axis and the small circle with a diameter equal to the minor axis. Divide both of these circles into the same number of equal parts. Draw from the intersecting points of these lines in the large circle, lines parallel with the minor axis and from the points on the small circle, lines parallel to the major axis. The points where these lines intersect will be the curve of the oval.

Animalculae in Water.

In his recent lecture before the American Institute, on "The Micsoscope and its Revelations," President Barnard of Columbia College said: "No animal can live on mineral food—upon earth, or asses. No plant can assimilate organic materials—the flesh of animals or the substance of other plants. The organic matter of soils, or of the fertilizers applied to them, affords no subsistence to the growing crop till by decomposition it ceases to be organic. This distinction is as decided among the minutest and simplest of the forms of living things, as among the most conspicuous and complex. All true microscopic animals, like other animals, may be seen to ingest and digest their food; and this food consists always of other animals, which are their natural prey, or of the lower orders of vegetable life; while vegetables draw their support from water, carbonic acid, ammonia, and set free oxygen under the influence of the light of day. These animals, therefore, cannot live in waters perfectly pure, nor in waters which contain only mineral impurities; and a knowledge of this fact may serve to relieve the minds of those whom the ungarded statements of some writers have led to believe that all waters are at all times swarming with animalcular life. In the waters of the Croton, as it reaches our dwellings, I have rarely detected any living thing, either animal or vegetable. In the examination of the water, constantly kept up under the direction of our Board of Health, traces of life are occasionally detected; but, perhaps, it is well enough to observe here, that should any source of water be anywhere found to be absolutely, and at all times free from every indication of the presence in it of microscopic life, the presumption would be rather unfavorable to its wholesomeness than the contrary; since water which will not sustain animalcular life is hardly fit for man; and water which will do so will never be wholly and parmanantly without it."

The Manufacture of Cotton.

Switzerland employs 1,600,000 spindles, 15,400 spinners, and 15,000 other operatives. In 1856, it is reported that 2,678,448 pounds of spun cotton were exported, and 539,616 pounds imported. In 1863 there were exported 6,929,632 pounds, and 6,316,088 pounds imported. In 1866, however, the exportation fell to 4,002,656 pounds and the importation to 1,832 pounds.

Mining Summary.

GOLD AND SILVER.

California.

Under the caption, "Change in Mining," the Nevada *Gazette* says:—"Hydraulic mining, so far as small companies, or a limited amount of capital is concerned, is undergoing a change. Seven or eight years ago the number of companies employed in this branch of mining in Nevada County was twice, and perhaps three times as large as it is now. Then a hundred or two of dollars was sufficient, in many, if not most cases, to get claims in working order, and to make a beginning. Now the case is more than reversed, and heavy investments of labor and capital are required. To work shallow diggings a smaller amount of water was necessary, also a less pressure, and a less amount of hose and iron pipe. As miners have approached toward the center of gravel hills or ridges, the banks have become higher, while no more gold can pe obtained from a given area of surface. It makes a wonderful difference to the hydraulic miner whether he has to pipe off a hundred square feet of surface with a perpendicular depth of twenty-five feet, or whether to get the same amount of surface he has to wash down from one to two hundred feet of bank. It necessitates the use of from four to eight times the power to produce as much gold within the same time in the latter case as it did in the former. As nearly all the gold is found on, or within a few feet of the bed rock, the bottom has to be reached before anything like good pay can be found. At Blue Tent, miners have been unable to reach the bed rock yet, and as a consequence the claims there have never paid large dividends. Men with limited means, having deep diggings, must either sell to capitalists or allow their claims to remain unworked. In some instances small claims are being consolidated, or several companies are being merged into one, and by a concentration of capital and labor they are able to extend their mining into deeper gravel. Where fifty inches of water, and as many feet of pressure were sufficient, five or six times as much water and three times the pressure is now needed. This difference must certainly continue to increase for years to come. Greater hydraulic power, and other agencies more powerful than common powder, will have to be used in order to work successfully. Companies with a capital of from ten, twenty or a hundred thousand dollars will be the rule, and claims worked with less sums will be exceptions."

Nevada County.—The Nevada *Gazette*, December 12, has the following news from the Eureka District:—"The Erie mill is now crushing rock from the Jim Crack mine. The rock pays well, and the ledge is from twelve to fifteen feet wide. The Stacy & Banbury Company, have had a clean-up this week of a quantity of rock worked at Black & Young's mill. From eight to ten thousand dollars in amalgam was the result. The Birchville mill is running constantly on good pay ore from their own ledge. The Jim Mining Company have just received and placed in operation a new engine, boiler and pump, and are sinking on their claim for a lower level. All the mills mentioned have laid in a good supply of wood, and will be enabled to prosecute work vigorously all winter. E. Doliver has recently purchased the interest of Oscar Palmer in the Palmer & Everingham mill, and the new firm have just finished crushing two hundred tons of rock from the Iowa ledge, belonging to Morris & Co. For want of teams to haul wood and rock, owing to the approach of winter, they have suspended operations until spring. The people about Eureka are healthy, and all reports relative to small-pox have been false."....The same paper says:—"The new hoisting works at the Pitsburg mine are ready to start. They cost $20,000. About twenty tons of rock is daily hoisted from the mine, which is crushed at the mill, and is understood to be yielding good pay....Placer mining in Diamond Creek region is nearly suspended for the winter, but considerable is now being done in quartz mining. Pease, Dooling & Co. have located a ledge recently discovered, which presents more favorable indications than any in this region. It is over two feet in width, and prospects remarably rich. They have named it the Pawtucket. The Salathiel Company have struck good paying ore in their lower level, and have resumed active operations in the mine. The last crushing from the Comanche ledge, of thirty-six tons, made at the Salathial mill, yielded $30 a ton. The owers of the Cocomongo and Enterprise ledges are vigorously at work to open their mines. About seventy-five men are employed on the ledges mentioned above, and have their winter's supply of provisions laid in. Diamond Creek bids fair to be a flourishing mining camp next season....The Cornish mill and mine have been in active operation for months past. The company have a tunnel in 1,400 feet, and the ledge varies from two to five feet in width. They have been taking out and crushing about 200 tons of rock per month, and have an ualimited amount accessible from their tunnel. The four owners of the mill and mine had a dividend last month of $2,800 each....The Buckeye Company, operating in Buckville mining district, has bought out the Granite Tunnel Company for $60,000. The Buckeye Company has been taking out from $20,000 to $24,000 after each run, and by this purchase the company will not only be able to work its own ground, but also that heretofore held by the Granite Tunnel Compeny....The first clean up from the Hitchens & Larrimer ledge at Grass Valley since it has been under the management of Frank Morse, resulted in a brick worth about $6,100. This amount of bullion was the product of 124 loads of quartz, the rock yielding nearly $48 per ton. The ledge has been christened the 'Bay State.'....Dahle & Co., of the Banker Hill ledge, are putting up a new quartz mill at Rough and Ready. Some of the companies owning claims in this vicinity have resumed work, and are confident that they will make a strike after awhile....Hickey & Co. are running a cut through the bedrock for the purpose of getting sufficient fall for the working of their claims to a greater depth. The miners at Moore's Flat have abundance of water the year round, and are doing well in their claims....A survey for a tunnel 5,000 feet in length, from Missouri Canyon, to tap the rich gravel beds at North Bloomfield, has been completed."

Inyo County.—A letter in the San Francisco *Times* from a resident in the Cerro Gordo mines tells of the progress of their development, their prospects, and their advantages. Says the writer: "That it is a rich country in silver and lead has been proven, beyond a doubt, by the successful operation of a smelting furnace recently erected by Messrs. Belshaw and Elder, two worthy and enterprising gentlemen, and well informed in the practical operation of smelting silver and other ores, having had much experience in the mines of Mexico. Their furnace has run five days and has yielded fourteen tons of crude bullion, worth five hundred dollars per ton clear of expenses of shipment. The smelting furnace is supplied with a small engine of six horsepower for running a blower for the furnace and a quartz cracker. Mr. V. Beaudry has also completed a furnace, and intends supplying it with an engine as soon as it can be procured. He being a man of deeds more than words, there is little if any doubt of successful results. The mines are proving more remunerative by continued development. The rock is sold at from $100 to $200 per ton at the mine. Assays have been made as high as $700 and $1,000 per ton. The principal lead mine in the camp is called the Union mine; it is convenient for working, and is situated but a few rods from the first-mentioned smelting works. There appears to be an inexhaustible supply of lead ores, yielding from $40 to $60 per ton in silver. A short distance beyond lies the famous Belmont mine, looking exceedingly well, with abundance of rock at the mine worth from $150 to $500 per ton in silver. It is being constantly worked. There is also the San Ygnacio mine, successfully worked and rich in silver ore. A large piece, of some two hundred weight or more, has been shipped to San Francisco for exhibition. The Saint Lucas is also a mine well worthy of mention. I could continue to particularize, but the above-mentioned, being the most developed, may suffice. The natural advantages of this country for mining in silver ore are not perhaps excelled, if equalled, by any silver mining district yet discovered. The climate being mild, the mines are easy of access, both in winter as well as summer. During winter there is little snow, generally about one foot in depth, which soon disappears, except in places excluded from the sun. There is a good road for teams direct to Los Angeles, which is distant about 275 miles. This is the route by which the bullion is being shipped to San Francisco. The water and mill privileges at the Lake are extensive. There is an abundance of wood, and a good fall of water from the Sierra Nevada mountains, in numerous streams that empty into the lake. There is also the Owens River, which extends through Owens Valley, a hundred miles and more, and which is also supplied by numerous streams from the mountains. The valley is about eighteen miles wide, with many fine farms, producing wheat, corn and vegetables in abundance; also some fruit, for which the land is well adapted. To those seeking farming lands, this valley offers flattering inducements. The climate is mild, and there is good grazing for stock during all the winter months. Much of the unimproved land can be located and made productive. This camp consists of one store and a hotel."

Plumas County.—A correspondent of the San Francisco *Mining Press*, gives the management of the New York Quartz Mining Company a rather severe rub. He writes: "This property is situated N. E. of the Indian Valley mine, in Indian Valley, Plumas County. The ledge was discovered some years ago by the Kitts Brothers, and through their agent, N. Wescoatt, was sold to a New York Company for $20,000. This company appointed N. Wescoatt, Superintendent, built a mill of twelve-stamps, worked by water-power, and started work at the mill last fall. But soon it appeared that the ledge was not continuing, or at least that under Wescoatt's management no quartz could be found to keep the mill in supply. Wescoatt was superseded by Col. Perkins, sent out by the New York Company, and although work was still kept on to find the ledge or to find quartz at least, it was done without any favorable results, and to all appearance the New York Company will have to give up prospecting, and to add another idle standing mill to the many that are situated in the mining claims in California, which were started either unreasonably, or by incompetent parties, and which remain as constant causes of the distrust which is entertained by eastern capitalists of California mining enterprises. Both parties are to be blamed, and not the mines."....C. E. Smith, from Jamison City, reports that the Mammoth Co. have struck the ledge in their new tunnel. The rock is said to be better than anything heretofore discovered in that locality.....Turner & Co. at Black Hawk, have taken out this season, about $11,000...Coleman & Co. are driving away after some more of those $500 nuggets. A few months ago this claim was sold for $50. Now the claim is worth $600 to the share.

Alpine County.—The *Chronicle*, Dec. 5, says: "We have been shown a small lot of bullion, nearly three pounds, the result of the working of about three tons of ore from the Gould & Curry claim—one of the Pittsburg Co.'s claims near this town. The ledge was struck last winter, but this is the first lot of the ore that has been worked here. This bullion contains some gold, and the amalgamator is confident that it will pay well to work at the Co.'s mill. Men will be immediately set to work getting out ore. The bullion mentioned above will be moulded in silver brick style, and forwarded to the company at Pittsburg, Pa. The Pennsylvania tunnel this week cut a spur of very rich quartz. On Tuesday last, Superintendent Slaven shipped to San Francisco 1,492 ounces of silver bullion from the IXL claim. The President of the Mornidg Star Co. left for San Francisco this morning, with 1,600 ounces of bullion, being a portion of the proceeds of the Morning Star ore worked at the Pioneer mill, at Markleeville, by Kustel's chlorination process, which has proved a perfect success in working the rebellious ores of this company. The tunnel in the Morning Star mine has been run a distance of about 1,600 feet. The rich, black ore was struck at a distance of between 800 and 900 feet. At this point a spacious chamber has been made by the removal of the ore. From this chamber an incline has been sunk 110 feet, and a heavy body of rich ore struck."

Sierra County.—The Downilville paper reports that the owners of the Wolf Creek mine have struck splendid rock in their works, and intend to start their mill in a short time.. ....

"From a gentleman who has recently been engaged in mining operations in Sierra County, we hear says the *National*, most favorable reports concerning the quartz mines of that section. In the vicinity of the Buttes is a belt about a mile in width which contains a great number of well-defined ledges. The ledges are bounded on one side by slate, and on the other by serpentine, are plainly marked and can be traced by the croppings for a great distance. All the ledges in this vicinity are very large, ranging from 10 to 25 feet in thickness. One of the best mines is the Primrose, situated on Hog Canyon. For 600 feet the ledge advances 10 feet in thickness. A shaft of 168 feet has been sunk, and the rock shows well in free gold and sulphurets. Over $250,000 have already been taken from this mine from rock worth from $12 to $20 per ton. The Reis mine has a ledge from 20 to 25 feet thick, is being worked and pays well, the rock yielding from $12 to $15 per ton. The Union mine is prospering well. Rock can be taken out and milled at an expense of not more than $7 per ton."

Mariposa County.—The *Mail*, Dec. 11th says: "The Mariposa Co. has nearly completed the new quartz mill erected at the Benton Mills, which will crush quartz rock under the Ryerson process. The old mill at the same place, will also be repaired. E. O. Darling, of Bear Valley, has purchased the interest of W. W. Kelton, in the rich vein known as the Maggie Russell, in behalf of some San Francisco capitalist. The vein is said to be immensely rich."

Tulare County.—A correspondent at White River says: "There is but little mining going on here at present. Maltby is about to crush a lot of rock which is richer by far, than any taken out in this district. The Philadelphia Co. are getting ready to sink a very deep shaft; and that sums up mining matters. This district needs capital brought to develop it more than any mining district I have ever been in. I have not had a cent for three months."

Butte County.—The quartz mill at Yankee Hill, Butte County, was burned on Dec. 20. Insured for $8,000.

Yuba County.—The Marysvill *Appeal*, Dec. 4, says:—"I Ackley informs us that the Smartsville Consolidated Hydraul Mining Company, and the Blue Point Gravel Mining Compa are preparing to make the largest blasts ever made in this Stat It is expected that everything will be ready by the 15th inst when 1,200 kegs will be discharged by galvanic vattery by t former company, and 800 kegs by the latter."

Los Angeles County.—A gentleman from Soledad repor that Polk & Kabler's 5-stamp mill cleaned up $1,000 from a days' run. The mill of Searles & Yates will be completed by fi 1st of January, and will contain five stamps, and like that Polk & Kabler, will be run by water-power. The utmost con dence is felt in those at work. Some 80 men are now engage in the mines.

Tuolumne County.—Work has been resumed on the Tu lumne Mountain or Buchanan mine. Eight men have been work for some weeks getting out rock. The mill will soon started and the rock crushed. Many excellent mines are no lying idle that could, with proper management, be made to p well.

Kern County.—McKeadney run four days on 16 tons of ro from the Delphi, which yielded $2,950 in gold. The mine seem to increase in richness as it is further developed.

Nevada.

Humboldt.—The Unionville *Register* thus reviews mining the Humboldt Range of Mountains. It says: "This range mountains, which was the first to attract the attention of pro pectors and explorers east of Washoe, and which stood so hi for some years after its discovery in public estimation as a ri mining region, has, for some years, been under a cloud, wh other sections of the State still further to the east have co gradually forward in public favor, and the restless, speculati throng moved on to new fields of exploration, and poor old Hu boldt was voted a 'bilk' by those whose sanguine natures h made them millionaires in Humboldt on the strength of a fe hundred feet on a barren quartz boulder, located in their name but, amid all the gloom and darkness of the last three or fo years, a few persevering and tenacous individuals have never lo their faith in the hidden treasures of the Humboldt range, a are now beginning to reap their reward for perseverance, ener and indomitable courage in their undertakings. In addition the mines in this district which are now yielding good returns owners, we hear marvellous stories of the richness and extent the Alpha mine, on the other side of the mountain, immediate opposite this place, and have now on our table some samples the ore which leave no room to doubt the quality of that fou in the lode. At a depth of 200 feet below the surface, the led is found to be full twelve feet in thickness and well charged through with black sulphurets of silver, which yield readily und the ordinary simple process for working free ores. The Alp mine is situated well down on the foot-hills on the south side Panther Canyon, and about four miles from the railroad. It found in a belt of metamorphic limestone, which extends for miles in a north and south course along the western base of Humboldt range, or from near Humboldt City to Sacrame district, opposite Oreana. This belt carries with it, cropp out at intervals throughout its entire course, a number of qua ledges, sometimes large and bold, and at others barely co ing to the surface. The ledges, wherever found, sent the same general characteristics, and wherever charg with the ores of silver it can be recognized as longing to the same geological formation. In Sacram to district there are several ledges, somewhat known to fame the past, which are equally as promising at the outcrop as the Alpha mine, among which we may mention the Montana, chester, Sacramento, St. John and the Bullion mines, all which carry the same ore as that found in the Alpha. Furt to the north, and in Eldorado Canyon, are found several o ledges of the same character and in the same formation, wh will feel the new impulse given to that range from the fine de lopments in the Alpha mine. From near the summit of mountain to about midway down the eastern slope, there is other limestone belt, which extends in a north and south co nearly the whole length of the range, and which also bears numerable quartz lodes, which, however, are usually found the lower or east line of the belt. In Prince Royal, Santa C and Star districts, base metals have predominated pretty larg in the ores, and rendered them very difficult of reduction. Etna, in Prince Royal district, the Little Giant in Santa Clara, the Almira and Yankee in Star district, the Arizona and Man woc in Buena Vista district, are exceptions to the gen rule, and are similar in many respects to the ores found in belt on the west side of the mountain, being composed of a sulphuret ore, easy of reduction, and having all the general racteristics of all ores found in limestone, not excepting the of White Pine. There are, however, a large number of le on the eastern slope of the Humboldt range, many of them and carrying large quantities of metal, which have not hereto been worked to profit, although large sums, in many instan have been expended in their development. Chief among ledges of this class is the famous Sheba ledge, in Star distr which was once the most celebrated lode east of the Comst The Sheba is at the lower margin of the limestone, and seem occupy an intervening space between that formation and a of porphyry, against which the limestone rests. The ore of Sheba was found in irregular deposits in a wide lode or ore c nel from fifty to one hundred feet in width. The yield of although paying in some instances as high as $1,000 to the was not sufficient to pay the expenses of mining and mill owing to the amount of dead matter encountered in extrac the ore. Somewhere from seventy-five to one hundred thous dollars were taken out, when, owing to financial embarrassme work was suspended, and has not yet been resumed; but understand it is the intention of the company to take hold in the spring. The De Soto mine is on the same vein, exten south from Star Canyon, while the Sheba extends north. The of the De Soto resembles in every respect that of the Sheba, instead of being found in irregular masses scattered throu large amount of vein matter, it is found in a regular and well de lode of not more than 8 feet in thickness. The quartz which constitutes the vein matter is not so well charged with me ores as in the original Sheba, which, when worked, did not p exceed $75 to the ton. The company, too, we understand, resume work in spring. The Almira and Yankee are also in district, and have in the past been regarded with much favo shared the general depression which spread over the whole boldt range, but the favorable turn of affairs in our country the developments made in the Arizona and Manitowoc, whic similar in all respects and found in a continuation south o same belt, will give renewed courage and reawakened i these mines at no distant day, when we trust that those have so faithfully and energetically devoted their time, and m to their developments will meet with a just reward.

White Pine—Says the San Francisco *Alta California*, 24: "One of the heaviest, and, probably, *the* heaviest m contract, considering the amount of ore and the quantity of lion expected to be realized therefrom, ever made in San cisco, was closed yesterday. The parties to the contract a

Aurora Consolidated Mining Company of White Pine District, Nevada, recently incorporated by Governor Blasdel and others, of the first part, and Frank Livingston of this city, of the second part. The company agrees to furnish all the ore which a thirty-stamp quartz mill of the most approved pattern can work for one year, say from 8,000 to 12,000 tons, and pay $25 per ton—just half the present rate at White Pine—for hauling and working it. Mr. Livingston, on the other hand, agrees to erect the mill without unnecessary delay, take the ore from the dump and work it up to 80 per cent. of the assays. The Oasis mill at Silver Springs belonging to the Eberhardt Company, is understood to be working the Treasure Hill ore up to 92 per cent. of the assays, and where the agreement is for 80 per cent. the mill owner, of course, realizes the difference, which on $200 rock, would amount to about as much as the price agreed on for crushing and working. If the mill should be able to work 10,000 tons during the year, and the average yield should be no more than $100 per ton—half the usual estimate—the bullion yield would be $1,000,000; and should it, on the other hand, yield anywhere near the average of ore hitherto worked from that district, it would net at least four times that amount. Governor Blasdel, who has superintended the opening of the mine, is confident that the supply of rock is abundant, but estimates the average yield lower than nearly everybody else, putting it at $100 per ton, as it runs, poor and rich together. How far the parties to this contract—which must be regarded as a singular one in the face of the experience in this state—may be satisfied with the result of the year's operations, will be interesting to know."

Silver Peak.—The *Reveille* Dec. 24 says: "We are informed by a gentleman just arrived from this district that the mill of the Silver Peak and Red Mountain Company, which has been almost rebuilt during the past four months, is now working perfectly in every department. The mill is of the capacity of twenty stamps, but ten stamps, which were on the ground, were to be added immediately. These thirty stamps will crush wet forty tons of gold-bearing quartz daily. The mines—the gold-bearing ledges of Red Mountain are the only ones that are being developed at present—are producing large quantities of ore, which is carefully assorted and classified at first, second, and third grades, the yield of which will range from $15 to $200 per ton. The quartz occurs in such vast quantities that the process of extracting it resembles quarrying rather than mining. These mines are about eight miles from the reduction works, and the ore is hauled at a merely nominal expense. It is transported over an ingeniously devised and constructed tramway for the first mile and a half, and is then transferred to enormous wagons which carry it over a hard, smooth, perfect grade to the mill. It is believed that these wagons are the largest on the coast. The tires of the wheels are five inches broad, the hubs eighteen inches in diameter, the spokes look like the arms of a water-wheel, and the fellows have no inmassiveness and strength. While our informant was at the mill one of these wagons, drawn by twelve mules, arrived with 24 tons—48,000 pounds—of quartz, which is the ordinary load. Before the next summer the property of the Silver Peak and Red Mountain Company will attract general attention.

Bullion Shipments:—The Austin *Reveille*, Dec. 23, publishes the following:—We learned to-day from the persons who arrived in this city yesterday from Silver Peak, that on the 15th instant three bars of bullion, valued at $4,600, were brought to that district from the adjoining one of Palmetto for shipment to San Francisco. The bullion was produced by Catherwood's mill. ... There were received at the National Bank in this city last evening, ten bars of bullion from Belmont. They are the result of eight days' run of Col. Buel's ten stamp mill on ore produced by Leon & Co.'s El Dorado South, and the first small instalment of a large lot which is to follow.....This morning Wines & Co's stage from White Pine brought into this city six bars of bullion, averaging 980 fine, and valued at $11,031 26, from the White Pine mill. We believe the fine bars were produced from ore obtained from the Eberhardt".....The same paper Dec 28, says:—"Yesterday 10 bars of bullion, of the average fineness of 950, and valued at $12,747 33, were brought into this city consigned to W. S. Gage & Co. They were produced by the Centenary mill in the district of Newark."

Montana.

The *Deer Lodge Independent* says:—"It is safe to assert that there has been more gold taken out of the mines in this country during the past season than from all the rest of the mines in the Territory besides. And yet the mines of this country bid fair to give a more bountiful yield at each succeeding season for several years yet to come. It is astonishing to look around us and contemplate that the vast gold fields that are almost within sight of the town of Deer Lodge. The vast and extensive valley of Deer Lodge has thousands of gulches, canyons, ravines, etc., putting into it, hundreds of which, it has been proved, contain gold in paying quantities. Beginning at the City of Deer Lodge and traveling up the valley, and to the left of Deer Lodge river, we first come to the mines of Boomerang and Carriboo gulches, about ten miles from this town. These gulches both pay from $10 to $20 per day to the man. In their immediate vicinity are Oro Fino and Dry Gulches and others, which yield well, though not so well as the two first mentioned. At these mines there are several miles of excellent water ditches, which are splendid paying property. Twenty-five miles further up the valley are the well known Mines of Silver Bow, which for three years have been good mines, and owing to the introduction of a new and bountiful supply of water (theretofore scarce) via the Divide Ditch, crossing the main Rocky Mountain from the head of Divide creek to the mines of Silver Bow, will be better mines next season than ever before. A few miles further up Silver Bow creek, which is the main or head tributary of Deer Lodge river, are the Rocker Mines, lately increased in value by new water ditches just being completed. This is where the large nugget, that took the premium at the Montana Fair, was found. Five or six miles above the Rocker mines, are the Butte Mines, that have paid well and are still held at high valuation by their owners. Messrs. Humphreys & Allison, Swartz & Noyes, and others, have constructed ditches to convey water to these mines, and still 'more water' has been the cry of the miners ever since the mines were discovered. Messrs. Humphreys & Bro. are now engaged in tunneling the Mountain above Butte City, to tap Elk Park, on the Atlantic side, so as to furnish water from the Boulder to the Butte mines. Near the three last named mining camps there are seven or eight smaller gulches that produce good yields to those who work them. The gold found in the mines last mentioned is only worth about $14 per oz, owing to a large admixture there with of silver. Near Butte City are some of the richest silver lodes in the Territory—also, some good gold-bearing lodes. Fifteen miles from Butte, and in the south-eastern corner of Deer Lodge county, are the far famed Mines of Highland. The gulch here is partially worked out, but the lodes, such as the Nevins, the Only Chance, and the Balarat, are commanding much interest and attention. From the two first mentioned there have been some astonishing results obtained. The large Mill, under the supervision of Prof. Swallow, is now operating on quartz from the Balarat and Forest Queen. Going around the head of Deer Lodge valley, we next come to German and French Gulches, both of which may be set down as good average gold diggings. Ten dollars to the man per day is not an overestimate of their yield, from the beginning of the mining season to the end of it. There are several gulches that pay well near these, in some instances yielding more largely than either German or French gulches. Starting down the valley, on the opposite side, we came first to Cable City, near which are some of the richest lodes in Montana, and one, at least, of the richest in the world. There are two quartz mills here in successful operation, one of them, a poor mill at best yielding about one thousand dollars per day. Twelve or fifteen miles from Cable City are the Flint Creek Silver Mines. Many of the lodes here have yielded, by mill test, as high as $100 to the ton of quartz. The James Stuart mill, owned by the St. Louis and Montana Mining Co., one of the finest in the Territory, is situated in the heart of the Flint Creek mines. This mill has made some splendid runs on the Hope, the Poor Man's Joy, and the Rumley & Bugher lodes. Flint Creek may be set down as second to no silver mining camp in Montana, and hard to surpass anywhere in the world. The whole country thereabouts is checkered with veins of silver-bearing quartz, some of which are very wide and extensive, showing on the surface for a long distance almost as plain as a wagon road. Further down the valley are Antelope, Uncle Ben's and other Gulches, lying fifteen miles south-west of, and a little above Deer Lodge City. These gulches were discovered late in the fall, but enough work has been done on them to demonstrate the fact they are valuable mines. This takes us only half around the valley, and, in a mining point of view, half of that half has not been told. Around the upper end of the valley there are many important and good paying gulches which want of space compels us to pass by unnoticed. The many large water ditches constructed for mining purposes have been passed by unnoticed, with but few exceptions. The mines in other parts of the country, are more numerous than those already mentioned. With the real truth of the extensive mineral resources of Deer Lodge county well known, none can doubt that her claims to being the Banner County are well founded, and that her prosperity and future greatness are consequences inevitable."

[FROM AN OCCASIONAL CORRESPONDENT.]

North Carolina.

CABARRUS COUNTY, N. C., January 1, 1869.

The mineral veins which traverse Cabarrus County are nearly all gold-bearing. I doubt there being even a single exception. There is barren quartz, but it carries no metal of any kind.

Next to gold (iron, of course, excepted) copper is most frequently met with, although not always present. If antimony and arsenic exist, I am not aware of it. Silver is common at the rate of $1 to $3 per ton of ore. But a small percentage of the gold is free, and almost none of it coarse. Its matrix is generally a sulphuret of iron—the term "sulphuret" to be considered in its broadest sense. Most of the valuable veins have a N N E. course, although there is a system of cross-veins intersecting them at various angles, which sometimes yield handsomely. Their gold averages coarser, and lies more in pockets. The true veins in this series seldom exceed three feet in width—two feet is considered a good size, and many are much less. They are generally very steep, some dipping west, others east, and a few are absolutely vertical. When opened to any considerable depth, the walls become smooth and regular—sometimes, indeed, highly polished, and have a selvage of clay and other evidences of abrasion. Near the surface they are less uniform in width and quality, oftener split up with alternating layers of slate, and more disturbed generally. Although an occasional dyke is encountered and a vein is pinched, capped or shoved over, they are comparatively free from faults.

Although sulphurets are always present, they are not always the same. In scarcely any two veins do they exactly correspond, however, similar in their leading features. One family characteristic is fineness of crystalline structure; another an even and general distribution through the vein, and another the presence of some of the many phases of oxidation. "Brown ore" is common and very popular with native miners, the fire-brown or "Coffee ore" particularly so. This is frequently found in place, occupying a strip of varying width next to one of the walls. In the rude old mills which have produced most of our gold, this ore yielded better and easier returns than other sulphurets, not merely that it is richer, but because oxidation has already done nearly all the work. The quartz in these true veins presents much less variety than the sulphurets, being generally an opaque white, and very fine grained. It is much discolored by ferruginous stains, and is otherwise affected by surface agencies.

The foregoing applies especially to the western portion of Cabarrus County, where the country rock is slate. The middle and western parts are granitic, with corresponding peculiarities. Farther north, the features change again—not toward granite but more slate and more talc; some of the richest veins being a talcose slate. South of Rocky River, in this county, the veins have not so steep an inclination; the pyritic crystals are coarser, and sometimes occur in cup-like cavities in the quartz, where, after a few years exposure to the air, they suffer a flaky disintegration without losing their metallic lustre. Other forms exist, although, as a whole, the quartz and iron are less intimately blended than in this neighborhood.

It will be readily seen that I have here spoken mainly of what is elsewhere considered surface; namely, that portion of the veins lying above the water-line, and it will be questioned whether those conditions continue much below. Important variations certainly mark that line, although filtering can scarcely be credited with all the chemical changes apparent in these veins, as in some the sulphurets are intact almost to the grass, and in others they are brown and decomposed far below the reach of surface drip.

In the absence of the necessary data or desire to explain these effects, it may be safe to assume that our good mother Nature has nibbled the crust to sharpen the appetite of her little man, and having given him a taste of the auriferous pie, leaves him to finish it or go hungry. And if she has done it better for us than for the sharp set Northerners, it only shows that she recognized our greater need, and governed herself accordingly. H.

Michigan.

MENOMINEE RIVER MINERAL REGION, January 1, 1869.

EDITOR AMERICAN JOURNAL OF MINING:

Perhaps it may not be uninteresting to the readers of the JOURNAL OF MINING to hear from this region, of which, until recently, so little has been known.

Lumbering is the chief employment of the people, and the only money invested is in pine land, or connected with the lumbering interests. A new and perhaps greater source of wealth is now, however, attracting the attention of capitalists. It consists principally of iron, which, says Prof. Winchella, the State Geologist, in his epitome of the geology of Michigan, exists "*in specular and magnetic oxides, in mountain masses of unsurpassed purity and excellence.*"

These deposits offer unequalled natural facilities for working, surrounded as they are by hard wood timber for fuel, and limestone for fluxing; and lying only from 22 to 30 miles, by a perfectly feasible route for a railroad from Green Bay shore, and a good harbor. Thus they are connected by navigation with Buffalo, Cleveland, Chicago and all the eastern and western markets. Let any one for a moment consider these natural advantages, and it will be seen that this region can successfully compete with any iron-producing section of country. There is a company that has some iron interests here, and it is thought they will soon open a railroad to the mines; but the best mines are still held by private parties, and will probably have to change hands before their inestimable value can be fully known.

Canada.

THE RICHARDSON MINE.

The Belleville Correspondent of the Toronto *Monetary Times* gives the following abstract of the report of Mr. John H. Dunstan, Superintendent of the Richardson mine, Eldorado, Madoc, addressed to the President and Directors of the company, dated Dec. 30, 1868. Says the correspondent:—"After congratulating the Board upon the favorable report which he has been able to make, Mr. Dunstan goes on to say: 'On my appointment last May to the management of the Richardson Gold Mining Company's property, I examined the mill, and found it to be in so very unfit a state that I declined working it until partially refitted. On entering the mine I saw it had been worked without judgment, even the first principles of Mining had been ignored: and that it would not be safe to work it until thouorghly timbered. On reporting this to the directors then in office, they concluded not to proceed with the work until after the general meeting of the shareholders. From the new Board of Directors I received instructions to get the mill put in working order and make a test of the ore, which was done in August; the ore treated being some left in the rock-house of the mill by the former manager. After seven tons had been crushed the Sheriff seized and closed the works. On cleaning up, the result showed $9 per ton. The works then remained closed until October, when I received orders to put men to work in search of other veins, and to find out more about the property. After working about two weeks, a very promising vein of auriferous rock, 2 feet wide, was discovered; although it does not show much gold, yet the indications are very favorable. On Nov. 17th I again started the mill on refuse rock, the cullings of all previous crushings, taking the first from the outside of the shaft-house, of which I crushed 35 tons. I next commenced on the ore from the inside of the house, and crushed 175 tons, in all 210 tons, which yielded from $1.50 to $7 per ton, average $4 per ton. I then took a few tons from the mine, 20 to 25 feet from the surface, without sorting, and got a return of $7 per ton. The whole cost of crushing, including hauling, cordwood, &c., has been less than $1.50 per ton. Mr. Dunstan then proceeds to show that these amounts per ton, though apparently small, are sufficient under a good system of mining to pay at least 100 per cent. upon the total cost of working, and adduces several statistical items, taken from the AMERICAN JOURNAL OF MINING, Congressional Reports, and the record of some of the most successful mining enterprises, to prove that a much smaller tonnage return will, on a large scale of working under efficient management, pay ample dividends on the capital invested, even where the rate of wages and the price of cordwood are much higher than in Madoc. The report is accompanied by plans and sections, showing the extent and direction of the auriferous deposit, with its divarications and peculiarities so far as they have been developed, together with the adjacent stratified and massive rocks; and such additional works as in Mr. Dunstan's opinion will conduce to the more effective working of the mine. Mr. Dunstan states the expenditure of the company up to the present time at $30,000, a large proportion of which has been unnecessarily expended through the incompetence of the persons to whom the management of the works has been entrusted, while the rich deposit of gold found in the first instance, which ought to have repaid this expenditure and placed the company's affairs on a sound basis, has been totally lost to them for the want of an efficient supervision to restrain the pilfering propensities of their own employes and of the numerous visitors to the locality; for as the report avers, with truth, 'nearly every city, town and village in Canada, and very many in the United States, contain specimens, showing gold from the Richardson mine.' 'In conclusion,' writes Mr. Dunstan, 'allow me to state that although the present shareholders may fail to reap the benefit of their investments, there is no doubt that there are other parties willing to carry on the works, and give the mine a thorough test; and although we are not certain of anything in mining, yet in my opinion, every indication shows that the Richardson mine will, at some future period, be one of the best paying mines in the world.' I have only to add to the above, that I saw on Thursday last an ingot of gold, value about $320, the produce of the last crushing mentioned in Mr. Dunstan's report; and that I was shown this morning a specimen of gold-dust, worth, I should judge, about 50 cents, washed from a single pan of crevice matter taken from one of the newly discovered veins in the ninth concession of the township of Marmora."

COPPER.

Michigan.

Telegraphic correspondence of the Houghton *Mining Gazette*, dated Eagle River, December 28, reports "that sixteen men are employed in the Amygdaloid Mine, opening and cross-cutting in and from the new vein, and there yet remains a hope that a mine may yet be found. Impure air retards the operations somewhat." .....The *Gazette* says, touching the Quincy Mine:—"The disquietude which has, during the greater portion of the season, existed in the minds of the local management, as to the probable result of the peculiar phenomena found to exist in the bottom of the mine, we are glad to say is rapidly abating, as the last reported product and the appearance and future prospects of the backs of the 13th and 14th levels develop more encouragingly. There occurred in these levels a phenomena well known and often seen on a small scale, but never on such a grand scale in the segregated deposits of this country, which was peculiarly perplexing, and not a little alarming. The main phenomena was a 'division of the lode' into two parts; or, rather, the intrusion of a large body of trap into the amygdaloid of the lode, and termed by the miners 'a horse of trap.' In sinking and drifting from surface (probably), the openings were prosecuted in the upper portion of the lode, which was of average width and metallic contents, until the 13th level was opened, and preparations made for stoping, when so disturbed, broken up and impoverished became those portions of the lode which had heretofore been considered as certainly reliable for a major portion of the monthly product, that serious apprehensions were entertained that, for a level or two, at any rate, the lode would be so poor and disordered that it would be highly questionable whether its workings could be made profitable, under any circumstances. The old miner's rule that—'When you don't understand your ground, cross-cut,' proved a very good one in this instance, for after making a cross-cut nearly 40 feet into the body of trap supposed to be the footwall (though it did not correspond with the regular footwall rock) when the under portion of the lode was found, and found to be much wider and richer than had ever

been the upper portion. Continuing the cross-cut through this portion of the lode, it was found to be nearly 30 feet in width, and well filled with every variety of copper, from smallest stamp to good sized masses. This was very good, certainly, yet none could tell what extent would be the deposit. Opening ground is slow work, and after months of anxious labor, enough progress has been made to make it quite certain that this portion of the lode was of unusual width and richness, and continuously so for a much greater length than there was reason to expect, or the most sanguine had hoped. Since the discovery of the second deposit, considerable time has necessarily been consumed in preparations to open and attack it. It took two months to make the cross-cut to this under portion of the lode, and another month to put it through it. To open 100 feet by drifts going in opposite directions, required over two months more, which, with a trifle of time for other incidental labors, has occupied the whole of the past season of navigation. While this work was being consummated, the product was made up from other portions of the mine, as it could be gleaned from what might be termed the roots of courses which have heretofore produced quite well. By this we do not mean to intimate that they are cut out, or being cut out even, but simply that at this point they are not as good as they have been at the levels above, now worked away. From what we have seen and since heard from the men employed in and near this phenomena, there is now a good prospect of some very good stopes in this under portion of the lode. The percentage of mineral per fathom is likely to be more than 'very good,' and the magnitude of the ground which, so far as can at present be ascertained, is of continuous width and richness is much greater than that of any of the rich courses worked since the commencement of operations. The principal point for congratulation, however, aside from the unexpected discovery of this rich portion of lode is, that it undoubtedly continues equally valuable for at least several levels above the point of discovery, and can be simultaneously attacked by cross-cuts from the 11th, 12th and probably many more levels above. How far up or down this division of the lode may occur, of course, is unknown; but from all appearances, there is extent sufficient for nearly if not quite two years stoping. Most of those who have examined this phenomena agree in the belief that these divisions and disturbings of the lode are more likely than not to result in a concentration of its mineral contents at some single point, and they also agree that it is highly probable that it is at the point just opened into so successfully that the concentration will most likely occur. At all events, the Quincy is certain to begin the year with as glowing prospects for the succeeding twelve months as at the commencement of any year in its history. In more respects than one we are glad that this mine is so rapidly emerging from under the cloud which has enveloped it for nearly a year past. We would have exceedingly regretted to have been compelled to announce that, like the Minnesota, it had grown broken up and poor as great depth was attained, for this would have been a serious blow to our entire mining interests."

MARKET REVIEW.

FRIDAY EVENING, Jan. 15, 1869.

Gold and Silver Stocks.—In the Colorado Stocks the sales to-day were limited to Smith & Parmlee, which went off at $2 65. Sales were made on Wednesday last at $2 70 against $2 60 last Saturday. Consolidated Gregory is not much dealt in; a sale was made on Wednesday at $3 75—a considerable advance in prices. In Nevada Stocks a stronger feeling prevails. $12 50 was asked for Manhattan on Wednesday. The Stock Board publish quotations as follows:

	Bid.	Asked.		Bid.	Asked.
Alameda Silver	..	30	Kipp & Buell Gold	..	..
American Flag	..	25	La Crosse Gold	8	15
Bates & Baxter Gold	..	50	Liberty Gold	..	..
Benton Gold	..	25	Manhattan Silver	90 00	120 00
Bobtail Gold	..	1 25	Midas Silver	..	..
Black Hawk Gold	....	....	Montana Gold	40	60
Consolidated Gregory	3 60	3 70	New York	85	1 00
Edgehill Mining	2 50	..	Nye Gold	..	..
Gold Hill	..	..	Owyhee Mining	15	22 00
Gunnell Gold	..	50	People's G. & S. of Cal	5	25
Grass Valley	2	9	Quartz Hill	70	72
Hamilton G. & S. B.	..	85	Rocky Mountain Gold	8	.. 15
Holman	..	5	Smith & Parmlee Gold	2 65	2 75
Hope Gold	..	..	Texas Gold	..	10
Twin River Silver	....	..	Corydon	..	..
Gunnell Union	..	30	Symonds Fork Gold	20	75
Combination Silver	1 60	4 00	N. Y. & Eldorado	10	20
Sensenderfer	....	....	Mariposa	6	6½
Quicksilver	22½	23½	Mariposa preferred	20½	21½
Atlantic and Pacific	....	40			

Copper Stocks.—Davidson Copper is held at 60c., against 55c last week. At Boston, to-day, prices were quoted as follows:

Copper Falls	15	Quincy	22
Franklin	13	Cary Improvement	7½
Hancock	3	Hecla	70
Minnesota	2	Bos. Hart. & Erie R. R.	27
Calumet	....	Isle Royal	..
Water Power	14½		

Petroleum Stocks.—Prices are quoted as follows:

	Bid.	Asked.		Bid.	Asked.
Bennehoff Run	..	60	Rynd Farm	15	..
Brevoort	1 00	....	United Pet. Farms	10	..
Buchanan Farm	50	65	Union	....	....
Central	45	..	United States	1 35	1 45
Clinton Oil	1 00	....	Sherman & Barnsdale	..	..
National	3 25	4 00	Second National	..	..
N. Y. and Alleghany	.. 50	85	Bliven	..	..
Pithole Creek	..	1 25	Rathbone	..	..
Home Petroleum	....	....	Northern Light	..	....
Pacific Oil	..	....	Bergen Coal and Oil	..	..

Miscellaneous Stocks.—Wallkill Lead is quoted at 13@15; Rutland Marble, 16 25@16 50; Brunswick City Land, 9 00@10 00; Cumberland, 37½@38½; Cary Imp., 7½; Del. Lac. & W., 120½; Mar. Trustee 10s Ctfs., 54; Buff. N. Y. & E. 1st M., 89; Canton Co., 55; W. U. Telegraph, 33½; Pacific M., 123@123½; Adams Express, 51½@51½; Wells Fargo Express, 26; Merch. U. Ex., 38@39; Erie Railroad, 39@39½; Harlem R. R., 132@132½; Reading, 95½@96; Mich. Central, 116; Clev. &Pittsburg, 87½; Chicago & Northwes'rn, 82½; C. & N. W. Pf., 88½; M. & St. P., 74½@78½; Mil. & St. P. Pf., 94; P. Ft. W. & Chi., 120½@120½; Chicago & Rock Island, 128½@129; Cleveland, Columbus and Ind. Central, 47½; Ohio & M. R., 34; Chi. Burlington and Quincy R., 195.

State, R. R. and Other Bonds.—Tenn St 6's, new, 69½; Tenn. St. 6's, ex cpn., 69½; Va. St. 6's, ex cpn., 57½; Georgia 6's, 78½; Mo. 6's, H. & St. J. Iss., 87½; Cal. 7's, 125; Columbus C. & Indiana Central First, 79½@80; Morris& Essex 2d Bds., 95; Chi. & Great Eastern 1st M., 97½; Chi. & R. I. & P. R. R. 7's, 94; Chi., Burling. and Quincy 8's, 110; Erie 3d, 92½; D. L. & West, 120½.

Government Bonds.—Prices are somewhat higher this week than last, but the tendency to-day was downward:

U. S. 6s, 1881, coupon	112	@112½	U S 5-20s, '65, new coup.	108	108½
U. S. 5-20s, 1862, coupon	112½	112¾	U. S. 5-20s, 1867, coupon.	108½	108¾
U. S. 5-20s, 1864, coupon	109	109½	U. S. 5-20s, 1868, coupon.	108¾	108¾
U. S. 5-20s, 1865, coupon	109¼	109½	U. S. 10-40s, ex. coupon	107⅞	107⅞
6 Per Cent. Bonds, P. R. R.	101½	110½			

Foreign Exchange.—Foreign exchange is quiet. The applications for bills are quite moderate, and the supply of produce and cotton paper is also limited. Rates are rather firmer, at the following range of quotations:

Lon. (pr. bks). 60 dys	109½@	109½	Swiss	5.17½	5.16¼
Lon. (pr. bks'), sight	110⅜	110½	Hamburg	36	36¼
London, prime com	....	....	Amsterdam (bankers')	41	41⅛
Paris (bankers'), long	5.15¾	5.15	Frankfort (bankers')	41	41⅛
Paris (bankers'), short	5.13¾	5.12½	Bremen (bankers')	78⅛	78⅛
Antwerp	5.17½	5.16¼	Berlin (bankers')	71¼	71⅛

Gold—The price of gold had advanced to 136½@136⅝. Cash gold is easer, loans being made at¼@¾ per cent. for "carrying." The following are the quotations for other coin:

American Silver	95½@ 96
Mexican dollars	103½ 104
English silver	480 485
Five francs	95½ 96½
English sovereigns	487 489
Twenty francs	385 387
Thalers	70½ 71

The difficulties between the Express Companies make very slow progress towards a solution, and the differences are likely to seek settlement in the courts. The American and Merchants' Union Company offer to release the Adams Company from the combination of the several companies upon condition that the Adams issue to them the very modest amount of $3,000,000 of their stock, the consideration being the restoration to the Adams Company of the routes it surrendered to the combination.

The Adams stockholders are, of course, opposed to this proposal, and an application, is likely to be made to the courts for an injunction restraining the company from making such an issue.

Money is in good supply, and has settled down to average 7 per cent. rate. The banks report free arrivals of currency from the Western cities, including Cincinnati, while the remittances of currency to the South are declining.

Discounting operations show a fair degree of activity at the rates, viz.; 8@10 per cent. for prime paper.

We are indebted to Messrs. Platt & Newton for financial advices from San Francisco, December 30, 1868;

"Our local money market has undergone no change since our last issue. The demand is lively, but the supply is fully adequate for all requirements. Deposits continue to increase in our savings and loan institutions, denoting thrift and industrial energy. Money can be had in bank at the rates which have become chronic, viz., from 1 to 1½ per cent. per month. Bullion is in good supply, with fair demands; gold bars are quotable at 860@865, and silver bars sell from par to ½ per cent. premium, according to quality; currency bills on Atlantic cities pay 85½ per cent. premium on gold; slight drafts, payable in coin, being 1 per cent. premium; telegraphic transfers are effected at 1½ per cent. premium; sterling exchange, 48½@49d.; commercial do., 49½@49¾d.; Mexican dollars are abundant at 4½@5 per cent. premium. Gold in New York, December 28, 134½. Legal tenders rule with us at 73½@74½ cents."

Copper has advanced to 24½ for Detroit and Lake Superior; 24½ for Baltimore, with sales of 300,000 pounds cash, and 200,000 pounds for March delivery, at 25 cents. The market is firm, with a rising tendency, and but little is offered.

The London market advanced, on the 9th inst., to £75 for Chili.

Tin—A large business has been done at 28½c. for Straits. Sales of 5,000 slabs, part to arrive in Boston, at 29c. Banca is neglected at 30½c. English, 27½c., all gold.

The London market advanced to 112 for Straits, and the Amsterdam to 66 florins, for Banca.

Spelter—More business at $6 25, gold, for Silesian; slabs 200 tons, part to arrive; American, 10@11c.

Lead is very dull at $6 30 for ordinary foreign.

Zinc—The market price for Metallic Zinc, in Sheets, is 12½@13c., currency. Oxide, American, 7½@8c., currency; French, 11½@12c., currency.

Antimony—Dull at 18 to 19c., currency.

Oils—For linseed prices are stronger, with a fair inquiry. Crushers have advanced their price to $1. There are no sales of full parcels. Crude whale and sperm are quiet and very firm.

Petroleum—Crude, in bulk, is stronger, with less inquiry; a small lot was sold at 21c. Refined standard white—there continues a good business and full prices are ruling; we quote at 35c. for standard white; the sales are 1,000 bbls. for March, at 35½c.; 2,000 bbls. for March, at 36c.; 1,500 bbls. for January, at 35c.; 2,000 bbls. for March and April, at 36c., and 9,000 bbls., buyers' and sellers' option February delivery, at 35½@36c. Naptha is active; 3,000 bbls. were sold at 12c. For Philadelphia delivery there is a fair speculative inquiry for standard white at strong prices, closing at 34c.; the sales are 2,000 bbls. for January delivery, at 34c.; 3,000 bbls. for January, February and March delivery, at 34½c., and 2,000 bbls., from April to July, at 35¼c.

Receipts for the week ending Jan. 12	pkgs.	20,164
Exports for the week ending Jan. 12	galls.	484,048
Exports from Jan. 1	galls.	651,767
Exports same time last year	galls.	1,830,655

The following is the quantity exported from other ports, Jan. 1 to Jan. 9:

	1869.	1968.
From Boston, galls.	101,681	44,368
Philadelphia	291,073	730,277
Baltimore	6,000	3,580
Portland	....	6,800
Cleveland	....	....
Total	400,754	785,115
Total exports from the United States	1,194,187	2,551,961
Same time in 1867		1,570,090
Same time in 1866		2,012,828

THE IRON TRADE.

NEW YORK, January 15, 1869.

The market for American Iron remains extremely quiet, with but few sales of moment. The high prices now asked by furnace companies are a bar to any business, and consumers are looking for lower prices. We note sale from second hands of 200 tons No. 1 and 2, Thomas, at $39 and$ 37.

Scotch Iron transactions are small, 400 tons Glengarnock Ex. Ship, sold at $38, forced sale; 100 tons Macland and Clyde at $38; 150 tons Glengarnock at $39. Small sales of Eglinton at $39.

Scrap Iron quiet with no inquiry. We note sale 300 tons, to arrive, at $45. Old Rails are in small demand, and we hear of no sales of moment.

We copy the following remarks about Old Rails from a recent Circular of one of our oldest Brokers:—"Old Rails have not responded to the recent advance abroad, but on the contrary have shown great weakness, and actually declined from the higest point. The tendency continues unmistakably downward, and with the large quantity known to be on the way and being shipped from various porls in Europe, the future certainly does not look encouraging for shipments to this country. The market has begun to feel the effect of the extreme dullness now prevailing among the American Rail Mills, who have been the only consumers of Old Rails during the past three years. The forced and sudden demand for American Rolled Rails from the Pacific Railroads, who were compelled by law to use only rails rolled in the United States, taxed the ability of the American Mills beyond their capacity to produce. In this dilemma Old Rails offered a solution to the difficulty, and a demand suddenly sprum up for them from all directions, to meet which over 100,000 tons have been brought here from foreign countries. The Pacific Companies, after purchasing upwards of 220,000 tons of iron to build their roads, have withdrawn from the market, and as no other roads are now constructing who are obliged by law to use American Rolled Rails, the demand for Old Rails, from which they have been principally made, will to a great extent cease. The immense amount of Steel Rails laid during the past year will release and throw upon the market for this season's delivery an equal quantity of Old Rails, which would otherwise have been re-rolled for account of the roads owning them; and as the mills in this country have been gradually increasing their puddling capacity during the last three years, it is not reasonable to suppose that they will be in the market for any considerable quantity of Old Rails, unless at prices relatively below the cost of Pig Iron. There will be a strong effort made at this session of Congress to increase the duty on Old Rails and on Scrap Iron. Both now pay one dollar per ton less duty than Pig Iron, while both are a nearer approach to Manufactured Iron, and it is confidently expressed that the duty will be increased to something over the duty on Pig Iron."

Bar from store continues without animation. Russia sheet is in large stock. and duil.

BOSTON, January 13, 1869.

The market for Pig iron is quiet, and the sales have been confined to small lots at $43@$45 per ton for Gartsherrie and other brands. Amecican Pig iron is dull, and ranges from $40@45 per ton, as to quality. In Bar Iron there is really little doing, and sales are confined to small lots at $90@$95 per ton for common and refined English and American. In Russia Sheet Iron very little is doing, and prices range from 11½@13c., gold.

Import, from Jan. 1 to Jan. 9th	1869.	1868.
From Great Britain	....	....
Coastwise ports	17	1,712

PHILADELPHIA, January 12, 1869.

In Pig Metal there is no change to notice. Sales of No. 1 Anthracite at $42@$43, and No. 2 at $38@$40. Scotch Pig sells at $42 50 and $43, and Forge at $35@$35 50 per ton. Manufactured Iron commands $87 50 for Bars. Blooms are quiet.

PITTSBURGH, January 15, 1869.

The *Commercial* reports business not very active, most of the mills being stopped during the holidays, in order to make the necessary repairs and alterations; also for the proprietors to take stock and see how matters look. The sales were small, but holders report the market firm. The following are all the sales given:

ALLEGHANY COKE.

100 tons Coke	$38 00—6 mos
100 tons Coke	38 00—6 mos
100 tons Coke	38 00—6 mos

ANTHRACITE.

50 tons No. 2 Foundry	41 00—4 mos
200 tons Chickies Forge	41 00—cash
50 tons No. 1 Foundry	42 00—4 mos
50 tons No. 2 Foundry	41 00—4 mos

In the money market there is more ease; and without any heavy demand for loans.

Borrowers are supplied on open market at more moderate rates, and the banks are letting out freely to their customers, but little to outsiders.

Manufactured iron is inactive, but held with firmness. The following are the card prices:

IRON.

Common bar sizes	3½@4½
Horse Shoe	5½ ..
Heavy Band	4½ 5½
Hoop and Light Band	5 9½
Round and Square	8½ 7½
Oval	4½ 5
Half Oval and Hali Hound	4½ 5½
Boiler Iron	5½ 9
Tank Iron	5½

All sheets over 28in. wide, ¼c. ℔ ℔ extra.

Flat rails, punched and countersunk	4½ 4½
T Rail, 12, 16, 20 and 25 lbs to the yard	4 4½
Nail Rods	8½ 10
Coal Screen Iron	5½ 6½

	American.	Chare'l.	Juniata.
Sheet Iron, 10 to 17	5½	6½	9
Sheet Iron, 18 to 24	5½	7½	9½
Sheet Iron, 25 to 26	6	7½	9½
Sheet Iron, 27	6½	7½	10

All sheets over 28in. wide, ¼c. ℔ ℔ extra.

NAILS.

10d to 60d, Fencing and Brads	$5 00
8d and 5d, " "	5 25
6d and 7d, " "	5 50
4d and 5d, " "	5 75
3d	6 50
2d	7 75
3d fine	7 75
2d fine	8 75
½ lining	9 50
Clinch	6 75
Cut Spikes	5 25
Cut Boat Spikes	5 75

Barrel Nails—1in., $8; 1in., $7 50; 1¼in., $6 75; 1½in., $6 50; 1¾in., $6; 1¾in., $5 75.

Tobacco Nails, 50c. above common.

Finishing Nails—$1 25 above commou 4d to 40d.

Finishing Nails—1½, $9; 1, $10.

ABATEMENT.

Nails—12½c. ℔ keg off, in lots of 100 kegs and upwards.

TERMS.

Note or acceptance at 60 days, with exchange on New York, or a discount of 3 per cent. for cash, if remitted on receipt of invoice. Payment to be made in New York Exchange, U. S. Treasury Notes or their equivalent. No discount on bills of less amount than $50.

Market Prices.

NEW YORK, Jan. 15, 1869.

DUTY.—Bars, 1 to 1½c. per lb.; railroad, 60c. per 100 lbs.; boiler and plate: 1½c. per lb.; sheet, band, hoop and scroll, 1½ to 1¾c. per lb.; pig, $9 per ton, polished sheet, 3c. per lb. Payable in gold.

Am. pig, fy. No 1, best,	$40 00@41 00		
" " 2x frdy,	36 00	39 00	
" Grey Forge	34 00	37 00	
White and Mottled	32 00	35 00	
Pure white for Cal. mar.	32 50	— —	
Scotch Pig, No. I, best b'd	41 00	43 00	
" " " outside,	41 00	— —	
Wt. No. 1Scrap f'm yd.	....	45 00	
Ex ship	43 00	....	
Bar, Ref., En. & Am.	90 00	92 50	
Bar, Sw's, as. sizes,gold	87 50	80 00	
Old Rails	47 00	....	
R.R. Iron, For., f'm Stock gold	51 50	52 50	
R. R. Iron For., to imp.	50 00	— —	
" " Amer. at wks. currency	77 00	— —	
R. R. Iron, Am., deliv'd	80 00	— —	
Stl rails of any pattern at works, currency	....	....	
Solid Steel rls. For., gd.	110	— —	
Street Rails at works	85 00	— —	
Light rls. for mines &c. at works	$85 00@	— —	
Do. delivered here	....	— —	

STORE PRICES.

Bar, Swedes, ord'y sizes	— — 155 00
Bar, Eng. and Am., rf'd.	90 00 95 00
Bar, Eng. & Am., com.	87 50 90 00
Scroll	130 00 175 00
Ovals and half round	125 00 155 00
Band	130 00 — —
Horse Shoe	130 00 — —
Rods, ¼@3-16 inch	165 00 165 00
Hoop	185 00 190 00
Nail Rod, per lb	9½ 10½
Sheet, Rus. as'd. Nos. (gold)	10 11½
Sheet, s'gle. D & T. com	5½ 7
Rails, Eng., gold, ton.	54 00 55 00
Rails, American	75 00 77 00

STEEL.

English, cast 2d & 1st qual.	18 @23
Eng. Spring 2d & 1st qual	10 12½
Eng. Blister 2d & 1st qual.	11½ 20
English Machinery	13½ 16
Eng German 2d & 3d qual.	14 16
Am. Blister, "Black Diam'd,"	10½ 16
American, Cast, Tool "	19 —
American, Spring "	10 13
American Machinery "	— 13
American German "	10 13

Lehigh Valley Iron Trade.

Pig Iron transported by the Lehigh Valley Railroad Co. for the week ending Jan. 9, 1869:

From	Tons.	Total.
Carbon Iron do	150	8,360
Lehigh Valley Iron Co	240	9.840
Thomas Iron do	870	33,530
Lehigh Crane Iron do	210	32,125
Allentown Iron do	395	34,310
Robert Iron do	160	10,005
Glendon Iron do	410	22,364
Other Shippers	1200	18,080
Total	3,635	169,614

THE COAL TRADE.

NEW YORK, Jan. 15, 1869.

The demand for coal continues light, the mild weather deterring dealers from buying only in small quantities. Prices remain the same, but are uncertain, and almost any slight cause may induce a fluctuation. We repeat the assertion we made last week, that now is the time for the retail purchasers and consumers to lay in their supply. This hint, we trust, will be heeded in season by those who consult economy in their expenditures.

The amount of coal transported on the Delaware, Lackawanna and Western Railroad, for the year ending Dec. 31, 1868, is as follows:

Shipped North	610,720 11 tons.
Shipped South	1,118,064 16 tons.
Total	1,728,064 07 tons.

For the corresponding time last year:

Shipped North	515,657 07 tons.
Shipped South	1,203,663 14 tons.
Total	1,719,321 01 tons.
Showing an increase of	9,464 06 tons.

The shipments of the Wyoming Valley Canal South are:

For 1868	340,490 tons.
For 1867	369,099 tons.
Showing a decrease of	28,609 tons.

In the distribution of these shipments this year, 118,140 tons go to the seaboard at Havre de Grace. In 1867, the amount was 107,535 tons—an increase of 10,635 tons.

The following is a statement of coal shipped by canal during the boating season of 1868, and distributed upon the various canals as follows, viz:

	Tons.
Delivered upon the line of the Lehigh Canal	66,581 06
Do Delaware Canal	35,286 12
Entered the Morris Canal at Easton	161,828 00
Do Delaware and Raritan Canal at New Hope	493,005 11
Passed through the Delaware Canal to Bristol & beyond	293,245 06
Total	989,946 15

The following statement exhibits the amount of coal mined and sent to market in 1868, from the Collieries of the Broad Top Semi-Bituminous Coal Region:

Colliery.	Proprietor.	Amount.
Coalmont	Broad Top Coal and Iron Co.	15½
Cumberland	H. & B. T. R. R. Co.	4,297
Crawford	do. do.	6,065½
Powelton	Powelton Coal and Iron Co.	60,874
Barnet Plane	do. do.	....
Barnet	Orlusa, Ferris & Co.	40,029½
Dudley Slope	Wood & Bacon	18,716
Blair	Daniel Blair	18,742
Union	Cummings & Hartman	6,634
Moonedale No. 1	Semi-Anthracite Coal Co.	6,459½
Broad Top	Fisher & Son	17,658
Mansion	do. do.	4,458½
Carbon	Rathwell Wilson	8,638½
Cook	Broad Top Impt. Co.	8,263½
Mount Equity	Riddlesburg C. & I. Co.	12,230
Duval Shaft	Rathwell Wilson	24,087
Cunard	R. B. Wigton	22,499
Bedford	Reed, Wilson & Co	3,034½
Scott	Scott, King & Co.	788½
Edge Hill	Rathwell Wilson	12,395
Delaware	do. do.	....
Brewster	A. P. Wilson & Co.	15
Fulton	Six Mile Run Coal Co.	5,037
Shipments in 1867		280,936
		244,412
Increase		36,524

The following will show the exports of coal from the port of New York for the week ending Jan. 12, and for the season to that date, also the amount exported last year for the same period:

Exports for the week	tons	1,279
Do. from January 1	do	2,697
Do. same time last year	do	3,545

BOSTON, January 13, 1869.

English Cannel has been selling at $11@$20 per ton for large and small lots; and for Sydney and Pictou prices are nominally $8 50@$9 00 per ton. Anthracite is rather unsettled, on account of the mild weather for some weeks past, and prices of retail lots range from $10@12 per ton. Some parties are quietly working off stocks at the lowest rates, and cargo prices range from $9@10 per ton.

PHILADELPHIA, January 12, 1869.

There is less doing, but prices are unchanged.

The following table exhibits the amount of Coal that was passed over the various routes of transportation from the Pennsylvania Coal districts for the week ending Jan. 9, 1869, and for the season to that date. A comparison, is also made with the amount transported the corresponding week in 1868 showing the increase or decrease, as the case may be:

COMPANIES.	1867. WEEK.	1867. TOTAL.	1868. WEEK.	1868. TOTAL.	INC. OR DEC. WEEK.	INC. OR DEC. YEAR.
Phil. & Read. R. R.	32,692	221,706	15,326	182,636	d 17,366	d 39,070
Schuylkill Canal	....	1,032,928	....	1,594,897	....	....
Lehigh Valley R. R	33,853	198,988	36,468	194,651	i 2,615	d 4,388
Lehigh & Sus. R. R	....	....	16,275	....	....	....
Lehigh Canal	....	1,006,660	....	987,947	....	....
Scranton North	9,009	14,903	8,574	10,070	d 435	d 4,833
Scranton South	20,483	29,129	27,469	32,303	i 6,986	i 3,171
Penn. Coal Co. rail.	18,137	18,137	19,213	19,210	i 1,075	i 1,095
Penn. Coal Co. canal	....	21,169	....	29,004	....	....
Del. & Hud'n Canal	....	1,401,122	....	1,640,118	....	....
Shamokin	8,898	8,898	4,733	4,165	d 4,165	d 4,165
Trevorton	814	814	459	459	d 355	d 355
Short Mountain	1,692	1,692	585	585	d 1,107	d 1,107
Lykens Valley Co.	1,486	2,251	1,598	1,593	i 101	d 658
Hunt'g'n & B'd T'p	2,084	2,084	4,055	4,055	i 1,971	i 1,971
Wyoming South	....	369,099	....	319,764	....	....
Wyoming North	....	82,376	....	89,152	....	....
Williamstown Col.	....	123,109	....	180,304	....	....
Total	129,148	4,535,006	134,750	5,290,913		
			129,148	4,585,006		
Increase			1 5,602	1 755,907		

Lehigh and Susquehanna Railroad.

Report of Coal shipped for week ending Dec. 31, 1868.

WHERE FROM	WEEK. Tons. Cwt.
WYOMING REGION.	
Newport Coal Co.	....
Albrig'ton, Roberts & Co.	....
New England Coal Co.	....
Morgan Mines	....
Warrior Run Mining Co.	....
Parrish & Thomas	....
New Jersey Coal Co.	763 06
Gaylord Mines	....
Delaware & Hudson Canal Co.	274 06
Lehigh & Susquehanna Coal Co.	....
Germania Coal Co.	137 08
Franklin Coal Co.	....
Audenreid Improvement Coal Co.	....
Wilkesbarre Coal & Iron Co.	5,445 16
Union Coal Co	....
Mineral Spring Coal Co.	283 06
H. B. Hillman & Son	97 04
Bowkley, Price & Co.	218 17
Wyoming Coal & Transportation Co.	228 06
Henry Colliery	296 17
J. H. Swoyer	....
Everhart Coal Co.	1017 07
Morris & Essex Mutual Coal Co.	....
Shawnee	....
Pine Ridge Colliery	393 11
Lances Colliery	....
Consumers Coal Co.	....
Harvey Brothers	....
Lehigh & Luz. Coal Co.	....
Other Shippers	....
Total Wyoming Region	9,893 15
UPPER LEHIGH REGION.	
Upper Lehigh	2,920 04
Other Shippers	....
Total Upper Lehigh Region	2,920 04
HAZLETON REGION.	
A. Pardee & Co.	72 10
Linderman & Skeer	....
Sharpe, Weiss & Co.	....
Wm. S. Halsey & Co.	27 13
Harleigh Coal Co.	....
G. B. Markle & Co.	....
Ebervale Coal Co.	....
Stout Coal Co.	....
Buck Mountain Coal Co.	....
Coxe Brothers & Co.	....
Ashburton Coal Co.	....
Highland Coal Co.	....
Pardee Brothers & Co.	....
Jeddo Coal Co.	48 07
Mount Hall (J. S. S.)	....
R. R. Carter	11 06
Other Shippers	....
Total Hazleton Region	159 16
MAUCH CHUNK REGION.	
Lehigh Coal & Navigation Co.	....
Summit Mines	2,225 06
Room Run Mines	1,076 14
Other Shippers	....
Total Mauch Chunk	8,302 02
" Mauch Chunk Region	3,302 02
" Hazleton	159 16
" Upper Lehigh	2,920 04
" Wyoming	9,893 15
Grand Total	16,275 17
Corresponding week last year	4,206 03
Increase	11,120 19
Decrease	....
Forwarded South from Mauch Chunk by Rail	15,167 10
Delivered on line of L. & S. R. R. ab've M'ch Ck.	1,108 07
Delivered at Coal Port for shipment by canal	....
Total	16,275 17

Report of Coal Transported over Lehigh Valley Railroad

For the week ending January 2, 1869, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	PREVIOUSLY Tons. Cwt.	TOTAL. Tons. Cwt.
Total Mahanoy	284 07	9,544 10	9,828 17
Total B. Meadow	5,125 00	82,979 07	88,104 07
Total U. Lehigh	119 16	1,068 06	1,188 02
Total Hazleton	22,236 15	82,936 15	105,173 10
Total Wyoming	8,702 02	31,654 05	40,356 07
Grand total	36,468 00	158,183 03	194,651 03
Same time last year	33,853 11	165,136 02	198,989 13
Increase	2,614 09	....	....
Decrease	....	6,952 19	4,338 10
Forwarded east from M. Chunk by r'l	36,468 00	158,183 03	194,651 03
Delivered at Mauch Chunk	32 04	126 00	158 04
Del. on line of r'd above M. Ck	82 10	1,069 12	1,152 03
Del. ab. M. C. for use of L. V. rail'd.	2,044 07	3,745 13	5,789 19
To L. & S. r'd at Penn Haven for rail	50 19	4,071 15	4,122 14
Do. for shipm't by canal	....	4,184 06	4,184 06
At Packerton	....	401 12	401 12
At M. Chunk for shipment by canal	....	2,259 07	2,259 07
Total by rail and canal	38,678 30	174,041 08	212,719 08
Same time last year	33,573 15	166,436 08	200,310 03
Increase	4,804 05	7,605 00	12,409 05
Decrease	....	....	....

Schuylkill Coal Trade.

BY RAILROAD AND CANAL, FOR WEEK ENDING, JAN. 14, 1869.

	RAILROAD.	CANAL
St. Clair	3,434	....
Port Carbon	5,837	....
Pottsville	896	....
Schuylkill Haven	8,500	....
Auburn	498	....
Port Clinton	8,986	....
Company's use	976	....
Total for week	24,127	....
Previously this year	182,636	....
Total	206,763	
Same time last year	224,398	
Decrease	47,635	

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

At New York, Jan. 9, 1869.

Schuylkill R. A., choice	$....	Schuylkill Chestnut	$.... ....
" Ordinary	....	Lehigh W. A. L'p old Co.	....
" W. A. Lump	....	" Broken	....
" Steamboat	....	" Egg	....
" Broken	....	" Stove	....
" Egg	....	" Chestnut	....
" Stove	....	Shamokin	....

SPECIAL COALS.—DEALERS' QUOTATIONS.

Diam'd Vein R.A., Sch'kill	....	Old Co.'s W. A. Lehigh	6 25 7 50
Locust Dale W. A., "	....	Mt. Pleasant	6 25 7 50
Honey Brook " Lehigh	6 25 7 50	Buck Mountain	6 25 7 50
Harleigh " "	6 25 7 50	Buck Ridge W.A., Sh'kin.	7 25 ....
Spring M'n " "	6 25 7 50	H. Heils, E. F'klin, Lorb.	7 25 ....
Sugar Creek " "	6 25 7 50	New England Red Ash	7 00 ....
Sugar Loaf " "	6 25 7 50	Wyoming	7 00 ....

Dealers in these Coals may be found in our advertising columns.

At Philadelphia, Jan. 9, 1869.

Lehigh L'p and St'mb't	6 50 6 75	Henry Clay, Egg & St.	6 75 7 00
" Broken and Egg	6 75 7 25	Locust Mount Lump	.... 5 50
" Stove	7 75 8 00	" Steamboat	6 00 6 25
" Chestnut	6 00 6 25	" Broken	6 25 6 50
Schuylkill R. A	6 25 6 50	" Egg	6 25 6 50
" Chestnut	5 00 5 25	" Stove	.... 7 75
" W. A. Lump	.... 5 25	Lorberry Coal	8 00 8 00
" Broken	6 00 6 25	Shamokin	6 00 7 00
" Egg and Stove	.... 6 50	Franklin, (Lykens Val.)	8 00 ....
" Chestnut	5 25 5 60	Broad Top	.... 5 00
Hill & Harris, Egg & St.	.... 6 75	Burnside	7 00 ....

Scranton Coal at Elizabethport, Jan. 9, 1869.

(Corrected weekly by D. L. & W. R. R. Co.

Lump	5 00	Egg	5 50 ....
Steamer	5 25	Stove	7 50 ....
Grate	5 00	Chestnut	5 50 ....

Prices for Pittston Coal at Newburgh, Jan. 9, 1869.

(Corrected weekly by Penna. Coal Co.)

Lump, per ton, 2240 lbs.	....	Egg " "	....
Steamer, " "	....	Stove " "	....
Grato " "	....	Chestnut " "	....
Pea " "	....		

Lackawanna at Rondout, Jan. 9, 1869.

Lump	....	Egg	....
Steamer	....	Stove	....
Grate	....	Chestnut	....

65 cents additional to New York.

Lehigh Coal at Elizabethport, Jan. 9, 1869.

Lump	6 75	Stove	7 50 ....
Steamboat and Broken	6 25	Chestnut	6 25 ....
Egg	6 25		

Wilkesbarre Coal at Hoboken, Jan. 9, 1869.

(Corrected by Wilkesbarre Coal & Iron Co.)

Lump	6 25	Egg	6 25 ....
Steamer	6 25	Stove	7 50 ....
Broken	6 25	Chestnut	6 25 ....

At Baltimore, Jan. 9, 1869.

Wholesale prices to trade.			
Wilkesbarre by cargo or car load	$8 25 @8 50	Trevorton R. A	$.... ....
Pittston and Plymouth	.... 8 25	By retail, per ton of 2,240 lbs., delivered	10 00 10 50
Shamokin R., or W. Ash	.... 8 50	Georges C'k & Cumberland f. o. b. at Locust Point for shipping	.... 5 00
Lykens Valley, R. A	8 50 8 75		

At Havre de Grace, Md.

Cargo prices for shipment *south* of Patapsco River, (drawback allowed of 10 per centum.)		Shamokin R. or W. Ash	$.... @8 50
		Lykens Valley R. A	.... 8 50
		Trevorton R. A	....
Wilkesbarre and Pittston W. Ash	$.... @8 00		

These prices are nominal, navigation at this point being closed for the season.

At Georgetown, D. C. and Alexandria, Va.

George's Creek and Cumberland f. o. b. .... @4 75

These are the closing rates. Trade is suspended for the season and will be resumed upon the opening of the C. & O. Canal in March next.

Prices of Gas Coals.

January 9, 1869.

PROVINCIAL. Duty, $1 25	Coarse. Gold.	Slack. Gold.	AMERICAN.	Coarse. Currency.	Slack. Currency.
Block House	$1 75 @$	75	Westmoreland Co	$8 50	$8 00
Gowrie	1 75	75	Despard Coal Co	8 50	8 00
Lingan	1 75	75	Penn	8 50	8 00
Sydney	2 13½	71½	Newburgh Orrel Gas	8 50	8 00
Pictou	2 13½	1 18½	Delivered in New York.		
Little Glace Bay	1 75	1 00	West Fairmont Gas Coal	....	7 50
Caledonia	1 60	75	Run of Mine	....	7 00

Prices of Foreign Coals.

Duty, $1 25 per ton.

Corrected weekly by PARMELEE BROS., 32 Pine Street, N. Y.

Liverpool Gas Caking	$ 9 50	Liverpool House Cannel	18 00 19 00
" " Cannel	14 00	" " Orrel	16 00 18 00

Per ton 2240 lbs., Ex. ship.

PRICES FROM YARD.

Liverp'l House Orrel, scr'd	$20@23	Liverp'l House Can'l, scr'd	$22 00 25 00
Per ton 2000 lb., delivered.			

Provincial Freights.

TO NEW YORK.		TO BOSTON.	
Sydney	$3 50	Sydney	$2 75
Lingan	....	Lingan	2 25
Cow Bay	4 50	Cow Bay	....
Port Calidonia	4 25	Port Calidonia	3 00
Little Glace Bay	4 00	Little Glace Bay	2 75

Coal Freights.

(Corrected Weekly).

Rates of Freight from Newburgh.

RIVER.		EASTERN.	
On "Pittston" Coal, by boats and barges of the Pennsylvania Coal Co., per ton of 2,240 lbs.		Stamford	$1 60
Troy and West Troy	$ 55	Norwalk	1 60
Albany and Greenbush	50	Bridgeport	1 60
Coeymans	45	New Haven	1 60
Coxsackie and Stuyvesant	40	New London	1 80
Hudson and Catskill	35	Norwich	1 50
Saugerties and Barrytown	35	Mystic	1 80
Rhinebeck and Rondout	30	Stonington	1 85
Po'keepsie and New Paltz Land.	25	Sag Harbor	1 85
Fishkill Landing	20	Bristol	1 95
Cold Spring and West Point	30	Newport	1 95
Peekskill	40	Fall River	1 95
Haverstraw	45	Providence	2 00
Sing Sing and Nyack	50	Dighton	2 00
Tarrytown and Piermont	50	Warren	2 00
Yonkers	55	Pawtucket	2 20
The coal must be discharged with all reasonable dispatch, at the expense of the consignee, who shall also pay wharfage on the boat. Boatmen will tend guy while unloading.		New Bedford	2 10
		Boston	3 00
		East Cambridge	3 10
		Salem	3 00
		Newburyport	3 10
		Portsmouth	3 10
		Portland	2 90

Freights on Coal Sea-borne from Port Richmond, Philadelphia.

Nov. 21, 1868.—From Philadelphia and Reading R. R. Wharves, Phila., to

Bangor	3 50	New London	2 70
Boston	3 50	Dover	3 55
Providence	3 00	Cohasset Narrows	3 40
Lynn and discharging	3 50	Cambridgeport	4 00
Portland	3 50	Dorchester	3 30
Fall River	3 00	Fair Haven	2 75
New Bedford	3 50	Gloucester	3 40 3 50
Salem	3 00	Lawrence	3 40
Newport	3 00	Old Cambridge	3 80
East Cambridge	3 30	Saco	4 10
Newberryport	3 75	Roxbury	3 55
Portsmouth	3 75	Salisbury	3 80
Charleston	2 00	Greenport	2 75
Danversport and discharging	3 50	Norwich	2 75
Amesbury	3 90	Harlem	1 45
Beverly	3 50	New Rochelle	1 30 1 40
Charlestown	3 50	Sag Harbor	— — 2 75
Hingham	3 35 3 40	Spuyten Duyvel	— — 1 40
Marblehead	3 60	Williamsburg	— — 1 35
Nantucket	— — 3 50	Jersey City	— — 1 80
Plymouth	— — 3 85	New Brunswick	— — 1 20
Provincetown	— — 3 50	Alexandria	— — 1 40
Washington	— — 2 25	Fredericksburg	— — 2 20
Calais	— — 3 30	Wilmington, Del.	— — 1 00
Machiasport	— — 3 30	Bath	.... 3 70
Hoboken	1 60	East Greenwich	3 ..
Hyannis	3 50	Providence	3 ..
Malden	.. 4	Albany	1 95
Nahant and discharge	3 20	New York	1 50@1 60
Weymouth and towing	3 50	Troy	1 95

From Elizabethport and Port Johnson.

Albany	$1 10@— —	New London	$1 50 — —
Boston	2 60 — —	Newport	1 75 — —
Bridgeport	1 35 — —	New York	65 — —
Fall River	2 00 — —	Norwalk	1 35 — —
Hartford	2 00 — —	Norwich	1 75 — —
Hudson	1 10 — —	Pawtucket and towing	1 85 — —
Wareham	2 20 — —	Portland	2 60
Middletown	1 85 — —	Portsmouth	3 00
New Bedford	2 00 — —	Providence	2 00 — —
Newburyport	3 00 — —	Salem	2 50 — —
New Haven	1 35 — —	Augusta	3 25 — —

Foreign Freights.

New Castle and Ports on Tyne	£13@£15 keel.		
Liverpool	12s. 6d.@15s. ton.		
Australian	9 50@10 00	Lehigh	15 50@16 00
do. Wallsend	10 00 10 50	Liverpool	13 00 ....
Bellingham Bay	11 00	Pittston, ton	14 50 15 00
California	7 00 9 00	Scranton	14 00 15 00
Cumberland cks.	30 00 22 00	Scotch	13 00 ....
do bulk	28 00	Vancouver Island	12 50 ....
Chili	10 00		

Rates of Transportation to Tide Water.

[BY RAILROAD.]

To Port Richmond, Philadelphia.

Philadelphia and Reading Railroad, from Schuylkill Haven $2 00

The following are the drawbacks allowed on all coal shipped East of New Brunswick and South of Cape Henry, until further notice.

	Drawback.	Freight.	Nett
Lump	35	$2 00	$1 65
Steamboat	35	2 00	1 65
Broken	..	2 00	2 00
Egg	..	2 00	2 0
Stove	..	2 25	2 25
Chestnut	..	2 10	2 10

From Port Carbon, 8 cents per ton more.

To Elizabethport.

L. V. Railroad from Mauch Chunk to Easton	$ 1 00
C. R. R., N. J., Easton to Elizabethport	1 55
Shipping Expenses at Elizabethport	25
Total	2 54

To Port Johnson.

L. V. R. R.	$ 1 04
C. R. R. of N. J.	1 63
Shipping Expenses	25
Total	2 92

To Hoboken.

L. V. R. R.	1 04
Morris & Essex R. R.	1 63
Shipping Expenses	25
Total	$2 92

London Weekly Metal Report.

LONDON, E. C., December 23, 1868.

We are gratified at being able to report an animated business in some branches of the Metal trade, with a further advance in prices.

IRON.—The Welsh Ironmasters are well supplied with orders, and prices have still an upward tendency. Pending the quarterly meeting of the Staffordshire Ironmasters, few fresh orders are given out. Scotch Pig Iron has remained quiet at about 53s. 6d., cash.

COPPER.—The Smelters have declared an advance of 30s. per ton, making present quotations for sheets and sheathing, £81 10s.; best selected, £79 10s.; and tough, £77 10s. Few second-hand parcels are obtainable below these prices. A considerable amount of business has been done in Wallaroo up to £82 10s., cash and one month, and in Burra up to £83 with some prompt. The Liverpool market has been excited for Chili bars, with a large amount of business up to £72, cash; £73 to 74 is now asked for parcels afloat, and for delivery during February and March next year.

TIN.—The English Smelters have declared a further advance of £3 per ton on refined and common tin, making present quotations as follows: refined, £114; bars, £111; blocks and ingots, £110. Straits has advanced to £108@£109; Banca is quoted at the same price. The Dutch market has advanced to 63f. for Banca, and 62½f. for Billiton.

TIN PLATES are firm, and in all probability will follow the price of tin to some extent.

LEAD is quiet. Good soft English £19 to £19 5s.; L. B., £21 5s.

SPELTER has been neglected, the market is dull and prices irregular. We quote spot, London, £20, 2s. 6d., to $20 5s.; common outports, £20, sellers; specials, £20, 7s. 6d. to $20 10s.

VON DADELSZEN & NORTH.

SAN FRANCISCO STOCK MARKET.

A telegram from San Francisco, dated Jan. 14, quotes:

STOCKS.	Per Sh.		SHARES.	Per Sh.	
Gould & Curry	110@	112	Belcher	162	..
Savage	76	78	Imperial	102	..
Chollar Potosi	169	..	Alpha	54	55
Hale & Norcross	60	63	Amador	..	..
Crown Point	53	..	Kentuck	238	242
Yellow Jacket	15.15	15.10	Ophir	37	..

Refining Iron Without Puddling.

A correspondent of the Cleveland, Ohio, *Herald*, describes the method of refining iron without puddling, now in practical operation at the Shoenberger Juniata works in Pittsburg. He states that the process consists simply in combining, mechanically, oxides of iron with melted crude metal. If the mixture is thoroughly effected, the result is instantly a malleable iron superior to the best puddled balls. It is then only necessary to heat it as blooms are heated, and put it through machinery, to produce the best quality of horse-shoe bars from material which, if puddled, would yield only common iron, and at much less cost than puddled iron. The method employed at the Shoenberger works is to take the melted metal direct from the blast furnace (they have two large stacks) and run it into a large kettle of a capacity of five tons. From thence it is poured, in a stream about a foot wide, into a circular trough about twelve inches wide and ten inches deep, revolving on a radius of 7 feet or 14 feet diameter. Pulverized iron ore, Lake Superior, Champlain, or Iron Mountain, is used as the converting agent. The ore descends from a hopper into the revolving trough, and covers the melted metal as fast as it is poured in. The continuous revolutions of the trough produce alternate thin layers of hot metal and raw ore, and effect the combination in a very satisfactory manner. The machinery which accomplishes this is moved by steam and hydraulic power, and is so planned that one man, standing with his hands on valve levers, can manage the whole operation. When the trough is full, and before the iron cools, it is broken up into slabs of suitable size for the heating furnace.

[From the Arizona *Miner*, Nov. 14, 1868.]

AMERICAN JOURNAL OF MINING.—This *really excellent mining paper* has recently had a new dress, and now looks exceedingly well. It is published by Western & Co., New York City, and is *doing good work for Arizona and the East*. The subscription price is $4 per annum.

AMERICAN

Journal of Mining.

WESTERN & COMPANY, Proprietors

ROSSITER W. RAYMOND, EDITOR.

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DESIGNING, LITHOGRAPHING WOOD ENGRAVING, and JOB PRINTING

Executed in elegant style, on reasonable terms.

T. P. PEMBERTON is Corresponding and Traveling Editor.

W. B. HARRISON is Editor of the Mechanical Department.

NEW AGENCY.—GEO. E. CUMMINGS has been appointed our sole agent in Philadelphia, Pa., for the AMERICAN JOURNAL OF MINING, our new paper, the MANUFACTURER AND BUILDER, and our Spanish paper, EL CORREO HISPANO-AMERICANO. His address is 154 South Fourth street, Philadelphia, Pa., where all information respecting communications, subscriptions and advertisements for these papers will be gladly given to those who may wish to favor us with a call.

☞ Correspondents, exchanges and others addressing us should be *extremely careful* to write "JOURNAL OF MINING," instead of "MINING JOURNAL," and to give the number of our Box at the Post Office, which is 5969, to ensure safe carriage. Communications intended for publication should be plainly written, and on one side of the paper only.

NEW YORK, SATURDAY, JANUARY 16, 1869.

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In consequence of a new regulation recently adopted by the Postmaster of this city to facilitate the early delivery of mail matter, we have to request our correspondents, in addressing us, to give the number of our post-office box, No. 5,969, in lieu of, or in connection with our business office address.

EXTRAORDINARY INDUCEMENTS.—SUBSCRIBE NOW.

We are glad to announce that we have made special arrangements with the publishers of the *New York Weekly Tribune* and the *American Agriculturist*, so that we are enabled to offer unusually favorable inducements to those who desire to have the benefit of the reading of the four best journals in the country, devoted, respectively, to general news and progress, agriculture, mining and metallurgy, manufacturing and building. We offer the following very liberal terms to all wishing to subscribe for the AMERICAN JOURNAL OF MINING, together with one or all these papers.

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Upon the receipt of either of the above amounts by mail or otherwise, we will promptly forward the papers desired. Back numbers are at hand, so that we can furnish them to any who may wish. This is a rare opportunity to all who are not already readers of the JOURNAL OF MINING, and who have a desire to keep themselves well informed in regard to the steady development of an interest that will soon be eclipsed by no other in the country, in point either of magnitude or importance. Address

WESTERN & COMPANY,
Post Office Box, 5,969, New York.

THE CUT-OFF VALVE IN PRACTICE.

Some authors make the statement that in practice the benefit derived from cut-off valves is less than the theory teaches us to expect. We think that such a use of language leads to the erroneous impression that practice can sometimes be at variance with theory, while the truth is, that, in all cases, where such an apparent disagreement is observed, the theory is not wrong, but incomplete; and many theoretical data of the utmost importance and of powerful influence on the results obtained, have been left out of account altogether.

The subject of our present article is a striking example of this kind. The theory that the benefit to be derived from using steam of high pressure and a cut-off valve, may double and even treble the power otherwise obtained, (see page 25) is only correct when we leave out of account the greater loss of heat on the steam cylinder, due to its increased size and surface, and the oscillation of temperature of the steam before and after its expansion, which usually covers a range of more than 100° Fahr. the highest temperature being of course just before expansion, and the lowest at its termination. Since the heat of the steam is communicated to the cylinder, the latter will finally acquire a mean temperature between the two extremes, and consequently below that of the steam when just emerging from the boiler. Part of this steam will therefore be condensed in the comparatively cool cylinder, at the moment of its entrance, and evaporated again when the rest of the steam expands and pressure diminishes. The amount of loss thus suffered depends on the size and weight of cylinder and piston, the degree of protection by fitting on steam-jackets, the temperature and pressure of the steam, the velocity of the stroke, etc. This leads us to the conclusion that the precise advantage to be gained by the use of the cut-off valve, will differ in special cases, and cannot well be calculated. It is evident, however, that it will be greater, the higher the tension of the steam in the boiler, and the sooner it is cut off after the beginning of the stroke, but other advantages are more or less counterbalanced by the theoretical considerations just mentioned.

That, therefore, the results theoretically calculated on page 25 do not agree with practice, is due to the fact that the theory there explained is not the whole, but only a part of the theory, which, when complete, necessarily always must agree with practice. The minds of many practical men are unreasonably prejudiced against all theory, for want of considering this important truth.

COOKE, in his *Physics of Chemistry*, states that with all the best improvements, (cut-off, etc.,) the total practical effect will never be so great as the power given in the table (page), and JOHN BOURNE, in his *Catechism of the Steam Engine*, even goes so far as to say that "only in some cases an actual benefit is realized from the cut-off valve, and that in some engines it has been found experimentally that less benefit was obtained from the fuel when working expansively than without expansion—the whole benefit due to expansion being more than counteracted by the increased refrigeration due to the larger surface of the cylinder required to develop the power. In locomotive engines, with outside cylinders, the condition of the advantageous use of expansion has been made very conspicuous, as has also been the case in screw steamers with four cylinders, in which the refrigerating surface of the cylinder was consequently large."

The only way to counteract the causes which tend to decrease the benefit in question, is to have the cylinder well enclosed in a steam-jacket, or otherwise protected from refrigeration; to have no unnecessary large mass of metal for the steam to heat, and to bring the expansion to a point, where such a cooling of the steam is produced that it leaves the cylinder at the lowest practicable temperature. As the steam engine is simply an apparatus to convert heat into motion, that engine must necessarily work with the greatest economy (other sources of waste being closed) which wastes no heat by blowing off, or condensing with cold water, very hot steam—the cooler the steam is when discharged, the more economical in this respect is the engine; and this is the best reply to the opponents of the cut-off arrangement, who assert that a certain amount of steam or fuel can only produce a certain amount of power, no matter how ingeniously the details of the engine may be carried out.

It has been sufficiently demonstrated in practice, that the most economical of all steam engines is a so-called low pressure engine with condenser, worked at high pressure, say six atmospheres, provided with a cut-off at about one-sixth of the stroke, and furnished with a boiler of very large surface, say of the CORNISH pattern. In general, the boilers used in stationary engines are too small. It is better to have a boiler larger than is customary for the size of the engine attached; there is great economy in never being compelled to drive the fires, as is necessary in locomotive engines, the nature of which compels the use of as small a boiler as possible, but which, for that very reason, are not economical. Experienced men agree that a large boiler, with plenty of steam on hand, so that the fires may always be kept low, is economical. There are, of course, limits, which must not be exceeded. We should think that the boiler should have no more than twice the usual size. Several steam boilers used in this city were chosen in accordance with this view, and for many years have given the utmost satisfaction to their owners.

It is evident that the principle and arrangement of the boiler is of the utmost importance with regard to the economy of fuel, and the power produced in the engine. Rules have been laid down concerning the proportion between the size of the different boilers, and the power of the engine to be driven by them, which will be explained in another article, and at the same time some prevailing prejudices pointed out.

THE CATASTROPHE AT WIELICZKA.

The sudden, and, it seems, irretrievable flooding of the ancient and celebrated rock-salt mine of Wieliczka, is an important historical event. Our readers are probably familiar, or can easily become so, with the description given by BAYARD TAYLOR, and many other travelers, of this magnificent mine, the snowy purity of its interior, and the indescribably beautiful effect produced by vast illuminations of its subterranean chambers. The tourist will miss this unique attraction; and the more serious effect wrought by its destruction upon the people of the district and the revenues of the Austrian empire, time will disclose. Austria has been accustomed to receive millions of florins annually from the profits of this mine.

The flooding of a mine is not ordinarily a matter of such overwhelming importance. The water can be pumped out in time, and work resumed. But in a case like this, the water begins at once to destroy the structure of the rock; and pumping out the brine already saturated is only to admit fresh bodies, which continue with new vigor the work of ruin. Even walling up a portion of the mine was found insufficient. The water accumulated behind the wall, gnawed its way around the mansonry, through the salt-rock, and soon rushed through in torrents. We cannot see in the accounts thus far given to the public any hope for the resumption of rock-salt mining in the old spot. Perhaps other deposits may exist in the neighborhood, though it would be hard to find a match for the lost treasure.

If nothing is contrived to redeem the mine, there is only left the resource of revolutionizing the system hitherto employed, and boiling the brine to manufacture salt. This process is frequent, even in salt mines, (not brine-springs.) At the mines of Hallein, and other places in the Duchy of Salzburg, great chambers are excavated in the rock (which is limestone, containing a good deal of salt, and massive and pure enough to be quarried); and these are entirely filled with water, which is allowed to stand in them until it has sucked out from the walls and ceiling as much salt as it can hold in solution. It is then drawn off and conducted to the boiling works. In a chamber of this kind, the limestone of the roof, disintegrated by the solution of the salt, crumbles or splits off, and falls to the bottom. The floor is thus protected against the action of the water; and, as the vertical walls do not let go their limestone like the roof, they too, after being once penetrated to a certain depth, present nothing to the water but a barren surface. The successive fillings of the chamber with fresh water, to be converted into brine, result in a continual wearing away of the roof; and the whole chamber travels, so to speak, in this manner, from the depth where it was first excavated, upward to the surface. There are many such in a single mine. When in their upward course they get out of the saliferous rock, or too near the surface to be safely worked, they are abandoned. One chamber of this kind is reserved at Hallein, half filled with water, to show the visitor.

It is evident that this system of chambers could not be successful in a mine consisting of solid salt. The impossibility of confining water within walls of salt has been shown abundantly; and if such were the surrounding material, the form of the chamber would soon become irregular, and it could not be adopted to a system of regular extraction. The deposit of Petit Anse, Louisiana, is a very extensive and valuable one; but it lies so near sea level that the waves often overrun portions of the mines. If, mines are ever worked on a large scale, the difficulty which ruined Weiliczka, namely, the disastrous effect of water in a mine of soluble material, will be demonstrated by experience.

WINDING MACHINES.

We find in a French journal, *La Houille*, some interesting extracts from the recent report of M. ALFRED EVEARD, who was charged by the *Societe de l' Industrie Minerale* with the examination of the different hoisiting or "winding" engines exhibited at the Paris Exposition. M. EVEARD comes to the general conclusion that horizontal machines present great simplicity of construction and undoubted stability, while their parts are easily accessible; but that they require more expensive foundations and constructions, while they suffer a diminution of effect from increased friction, and their cylinders are liable to ovalization—a defect which is at once inconvenient and inevitable. On the other hand, the vertical engines are not exposed to this evil, and involve less friction, and less costly foundations; but they may be charged with a lack of stability and a certain complication and inaccessibility of their parts, while the position of the engine is less convenient, and the high walls and braces required make the whole construction scarcely less expensive than that of the horizontal engine. He recommends a modification of the vertical engine (*la machine verticale a bati pyramidale*) as possessing the advantages of both systems, free from the inconveniences of either, and answering the necessities of the present conditions of the explorations of mines. But he proceeds to indicate an approaching necessity which possesses the

highest interest for mining engineers in England and Europe.

M. BURAT, the distingished French engineer has stated the problem most clearly in the following words:

"In the most important coal basins, if we consider what has been the developments of the last thirty years, it is evident that the difficulties of production have been strikingly augmented. The most accessible beds have been literally "de-coaled" (*dehouillees*) to use the expressive term of the miners. To-day we are attacking those fields of production which we would scarcely have dared to think of, by reason of their depth and difficulties; and already we foresee, at no very remote period, the necessity of undertaking still harder tasks."

M. EVEARD thinks that the use of winding engines must some day be given up; that in the exploration of very deep beds economy and convenience will alike forbid the use of cables. The attempts to substitute something on the plan of the man-engine (now used in Europe and Lake Superior in this country, for the transportation of workmen into and out of deep mines) appear to have been unsuccessful in practice. An application of the screw has been proposed, but not tested on a working scale. Neither of these plans, moreover, are likely to be successful at greater depths than those to which cables may be satisfactorily employed. He suggests that the use of compressed air as a motive power will probably lie at the bottom of the true solution of the problem. This agent is already employed for all the purposes required. The Mont Cenis tunnel and the atmospheric express tubes of Paris and London show that it can be made to serve in cutting, ventilation and transportation; and if the details of mining could be simplified by such uniformity of means, the economical exhaustion of foreign coal deposits might be considerably postponed. Such a change is, of course, not yet imperatively needed. We cannot say that the idea is chimerical. Something must be done by-and-by; and it is high time that engineers were considering what the enginery for the deep mining of the future shall be. The actual experiment which shall demonstrate the practicability of such a plan as M. EVEARD suggests, will of necessity be an expensive one; and he is probably right in his concluding remark, "that the engineer who shall attempt to solve in this sense the problem of deep mining will doubtless find it easier to devise a satisfactory scheme, than to discover a company bold enough to give it the first trial."

ANSWERS TO CORRESPONDENTS.

E. B. R., OF N. Y.—The pressure of water upon the sides of a cistern or pipe containing it, is found by applying the principle that for every foot of perpendicular height of the column of water, it presses every square inch of pipe surface with a weight of 7 ounces. When your height of water, therefore, is 16 feet, it will have a pressure to the square inch of 7 pounds; and as a pipe of double or triple the diameter has four or nine times greater surface, it will be subject to a corresponding greater pressure. This explains at once why wider pipes must be made of much stronger material than narrow ones, in order to withstand the same pressure.

E. B., of N. Y.—There is a foundation for the assertion that a ship loaded with cotton will make quicker time than one loaded with iron; usually the centre of gravity of a ship loaded with cotton is as high as the hull is full; while, when loaded with iron, the centre of gravity is low, as the hull is not often half full. This comes when the load is not judiciously divided between decks, also bad sailing qualities. Another reason is—and perhaps it is the principal one—that ships loaded with cotton usually cross the Atlantic from west to east, while those with iron cross the other way. The first always makes better time by reason of the more prevailing west winds.

T. W. D., OF ———. All other things being equal, the size of the speculum in a reflecting telescope adds nothing to its power. This depends only on the focal length to which it is ground. There would be no trouble in casting a speculum of 12 feet diameter; but the difficulty would be in grinding it and give it the right parabolic curve, so that rays reflected would coincide all to form a sharp image. Such a speculum would not be available except when ground to a focus of some 200 feet radius, and would require a tube of that length.

T. A. B., OF CONN.—Asks why the electricity generated by a swiftly-running belt cannot be used to light the gas-burner in the shop? Of course it can, and very successfully, too. It takes a very small spark to light gas, and those belts produce plenty of electricity. Only it takes time and some study to arrange everything properly, and therefore may be well for those who have time to spare; for most people, however, it would not pay to bother themselves with it—as is also the case with a great many other very nice experiments.

X. Y., CATASAQUA, PENN.—We are not personally acquainted with the ores of the mines you name; and we cannot tell from your description whether it would be best to smelt them, because you do not give the percentage of zinc-blende and the value in silver. The expense of smelting in our western territories is its greatest drawback. The difficulty is not to get the silver out of our ores, but to do it *profitably*. To decide such a question, you should not depend upon letters to scientific journals, but employ a competent man to examine it thoroughly on the ground.

H. B. E., OF ———. Compressed air can never be an original motive power for any engine. It acts like a spring wound up, and requires a motive power to compress it; it will give the power back during its expansion, and may then drive any high pressure steam engine; that means, one without condensing apparatus.

D. AND S., OF MICH.—200 inches of water under four feet head is, when you mean cubic inches, equal to 8 pounds of water falling 4 feet, or a force of 32 foot-pounds; 100 inches water under 16 feet head is equal to 4 pounds falling 16 feet, or a force of 64 foot-pounds—the second force is double that of the first.

H. WERNER, NEW YORK CITY.—If you will call upon the Mechanical Editor of the AMERICAN JOURNAL OF MINING, he will give you the information about the lamp, as you desire.

M. S. W., OF TEXAS.—Is not the strain on the hoops of a cistern 10 feet in diameter double that on those of 5 feet diameter, with the same depth of water? Ans.—Certainly.

W. H., OF N. C.—Your letters are very welcome, and we hope you will continue to write. The JOURNAL will be mailed regularly hereafter to your individual address.

D. U., OF OHIO.—Soluble glass has been tried to coat the inside of cider and wine casks. It would serve very well if it would only stick; but it very soon peels off.

J. B., OF OHIO.—Is a raiser of tobacco for his own use, and finds it too strong for smoking. We advise him to raise another quality, less strong.

NEW PUBLICATIONS.

THE MANUFACTURER AND BUILDER, *a Practical Journal of Industrial Progress.* No. 1, January, 1869: Vol. 1. WESTERN & Co., Publishers, No. 37 Park Row, New York City.

Believing that the manufacturing and building interests of the United States were without any direct and adequate representative on the part of the Public Press, the publishers of this monthly are endeavoring to give those interests a full, able and trustworthy representation, and also to supply a long existing want among those engaged in industrial pursuits. As the cause of manufacturing and building is emphatically the cause of skilled labor, in laboring for the interests of the former the interests of the latter will also be advanced. Each number will contain a large proportion of original matter, prepared by some of the ablest writers of the day, and also contains notes on new discoveries and improvements; reviews of new publications, together with a summary of general progress of manufactures and building, both at home and abroad. The home department contains entertaining and instructive descriptions and explanations, etc., and especially such as illustrate the applications of science to domestic life. Each number is printed on the best quality of paper, and contains thirty-two closely printed pages of reading matter, and is illustrated with a number of original engravings. Terms of subscription, $1 50 der annum; single copies, 15 cents.

We have received from J. P. LAQUE, Esq., of White Pine, the first number of the White Pine *News*, a handsome and lively little weekly, which, if it continues as well as it has begun, will admirably serve to gratify, not only the desire which the White Piners, in common with all other Americans, have for a newspaper, but also the curiosity which all the world is just now feeling with regard to the wonderful riches and daily doings in that famous district.

Original Papers.

[WRITTEN FOR THE AMERICAN JOURNAL OF MINING.]

APATITE: ITS IMPORTANCE IN DOMESTIC ECONOMY.

BY DR. L. FEUCHTWANGER.

Apatite is a mineral phosphate of lime, similar in character to the bones of animals. This mineral phosphate is most essential to various kinds of vegetable growths, it being taken up from the earth and assimilated as one of their essential elements.

The mineral part of the bones of animals consists to a great extent of phosphate of lime. It must therefore naturally play an important part in agriculture; and, indeed, such for ages has been the general impression. Burnt bones lose by calcination one third part of their weight. This consists of organic matter, which is destroyed by the process of combustion. The residue is phosphate of lime, with from ten to twelve per cent of carbonate of lime, and a little fluoride of calcium and magnesia. Apatite, on the other hand, contains ninety per cent of phosphate of lime. The residue is chloride and fluoride of calcium. In the Canadian apatite about five per cent of silica and a small portion of carbon have been found. Burnt bones are much employed in the manufacture of porcelain. They are mixed to the extent of nearly forty per cent with the other ingredients, such as clay, feldspar, and flint. The reason of its employment lies in the fact that the phosphoric acid contained in the compound is the vitrifiable element, which at a high temperature, converts the other ingredients into a transparent enamel. Brazil and other countries, where the hides and bones of animals are of more account than their flesh, supplies the largest number of the latter for fertilizing purposes. Bones are likewise used in the arts for the manufacture of buttons, combs, and also in the production of phosphoric acid, phosphorus, phosphate of soda, and microcosmic salt. A large amount of bones are utilized by exposure to continued steam, which extracts from them all their grease and other organic matter. They are then ground and sold to the husbandman. The supply of bones is altogether inadequate to the demand, and in order to make up this deficiency other sources of phosphate of lime have been sought out. Guano, or *Huano* as it is termed in the language of the Peruvians, which consists of the accumulated and altered excretions of certain kinds of sea-fowls, was discovered in the hot climates of Africa and Peru some thirty years ago. It found a ready market in France and England. Coprolites were also found in large deposits, they proving to be the exuviæ of animals of former times, or, in other words, the fossil excrements of extinct animals. They contain about sixty per cent of phosphate of lime. The crystalline mineral phosphate of lime, or apatite, is found in nature in large quantities, especially in Norway, Sweden, Spain, Canada, and also in other localities. It has, of late years, been eagerly sought after to supply the great demand for phosphates as fertilizers.

It is, however, well known that neither bones, coprolites, nor apatite is applied to the soil in its insoluble state, being, in that condition, comparatively useless as regards the nutrition of plants. In order to render them fit for agricultural purposes, they must be converted into the soluble superphosphate. In order to effect this, one hundred pounds are treated with sixty-three pounds of oil of vitriol. The soluble superphosphate of lime is obtained, which product is generally employed for fertilizing lands.

The quantity of superphosphate of lime at the present day manufactured in England, the United States, France, and Germany, is said to be one thousand tons per day. This rate of production, at an average price of forty dollars per ton, would amount to the sum of fourteen millions of dollars per annum. It is now well known that the guano supply is gradually diminishing. We make no doubt that, with the increase of population and the extended cultivation of barren and worn-out soils, the demand for superphosphate of lime will reach at least twenty millions per annum. This shows the importance of utilizing nature's gifts to their fullest extent. The consumption of superphosphate of lime, in place of other substances used in the arts, is now comparatively small, but may at no distant day find a large application in the manufacture of phosphorus and phosphate of soda. A few years ago there was a good deal of inquiry made for phosphate of soda for the use of distillers, whose experiments proved that an addition of it would not alone accelerate the process of fermentation, but also produce an increase in the yield, and it is the main ingredient in Prof. HORSFORD'S Baking Powder, so well explained in his last lecture before the American Institute, which was listened to with satisfaction and profit by a large audience.

Some fine crystals of phosphate of soda have been manufactured from Canadian apatite; nor is there any reason why phosphorus,* not yet manufactured in this country, but imported from Germany and France to the value of one hundred thousand dollars per annum, should not be obtained in this country from the native mineral. In the manufacture of phosphorus the mineral apatite is first converted into a superphosphate, then mixed with plenty of charcoal and volatilized at a high heat. Phosphorus is the resulting product. It is used in the manufacture of friction matches, and also for the extermination of vermin. The phosphoric nodules from the lower silurian rocks of Canada, and the coprolites found in the fossiliferous rocks, are all of organic origin, and contain phosphate of lime in various proportions, ranging from fifteen to eighty-five per cent. These nodules contain frequently fragments of small shells; such sometimes present a spiral or other form of interior structure derived from their animal organization. Coprolites were first noticed by BUCKLAND on the English coast, but are now found in many other localities. They are used solely in the making of superphosphate of lime; while apatite, containing a uniform percentage of phosphate of lime, bids fair to compete with the other substances already mentioned in the manufacture of the various chemical compounds.

The superphosphate of lime obtained from the native phosphate of lime, forms the base of various manures, which, if well prepared, cannot but prove highly beneficial, as the sure means of communicating phosphoric acid to the crops. They consist essentially of superphosphate and sulphate of lime, with more or less undecomposed bone-phosphate and free sulphuric acid. When this compound is scattered on the surfaces, it remains unaffected until rain falls upon it, when it dissolves and trickles or soaks down into the soil, meeting here with its constituents (lime and potash) depositing here and there a particle of bone-phosphate, until the whole soil is filled with the precious fertilizer. The superphosphate, as stated above, is prepared from the apatite, eupychroite phosphorite, coprolite and phosphatic nodules, and also from bones, in which case it is called bone-phosphate, because it contains the earthly ingredient of bones. The phosphoric acid is mostly combined with lime in all the genuine guanos. According to the quantity of acid all these materials contain, their market value is determined. A good superphosphate ought to contain, according to JOHNSON, from 20 to 25 per cent. of posphoric acid, partly soluble and partly insoluble in water, and some ammonia or ammoniacal salts. The soluble part is for quick and energetic action, while the insoluable phosphoric acid renders its effect more lasting.

Guano, which, as is well-known, is formed from the excrecents of sea-gulls or fowls, pelicans and cormorants and found in the torrid zone of this continent, consists essentially of phosphates, but more or less intermixed with other minera or organic matters. On many islands in the Carribean Sea and South Atlantic Ocean, as also in the Pacific Ocean, large deposits of from 15 to 50 feet in depth have been discovered, composed of the rock guano. Nevassa, an island which every traveler to California passes, has produced over 100,000 tons of guano; Sombrero, a coral island, lying in 18° 36′ N. latitude, and 63° 27 W. long comprising about 100 acres contains the guano disseminated in veins through beds of limestone in inexhaustible supply. The Swan and Baker Islands have furnished large amounts of guano, brought into

* Phosphorus had been already discovered in 1669, by BRAND, in Hamburg. BOERHAVE, in 1733, tells us how to produce fire in a cold body, solely by exposing it to the air. He states that there was nothing more remarkable, setting gunpowder aside, than that a body should be produced, which though cold, like all other things when kept from the air, is no sooner exposed thereto, than it takes fire, and emits flames, without the mediation of any other body, or without mechanical attrition or application of fire to it.

market under the name of Columbian Rock Guano. These all contain phosphoric acid combined mostly with lime, but also with other bases such as ammonia or iron. The Sombrero contains 40 per cent. of phosphoric acid and 30 per cent. of lime, with a small amount of ammoniacal salts. The Peruvian guano contains less phosphoric acid (only 10 to 11 per cent.) but 50 per cent. organic matter, and 16 per cent. of ammonia. Some of the Baker Island guano contains even 83 per cent. of phosphate of lime.

All the guano from the Carribean Sea, and coming from Mexico or the Atlantic Coast, is frequently called Mexican guano, although Columbian guano is more proper. They all vary from 25 to 55 per cent. in their amount of phosphate of lime. The South Carolina phosphate, discovered in 1866 by Dr. RAVENEL, is found in two layers, one underlying the other from 2 to 3 feet, the upper layer is quite near the surface. Bones and teeth of large marine animals have been found in the strata, and the guano gives by analysis 65 per cent. of phosphate of lime and 9 per cent. of carbonate of lime, and some organic matter.

The *Nevassa Guano* contains not only phosphate but also carbonate of lime. According to Dr. LIEBIG of Baltimore, who is manufacturing a phosphatic manure from the Nevassa guano, it contains 6.27 carbonate of lime, with 63.55 bone and phosphate of lime.

The *Bolivian Guano* contains 63.61 per cent. of phosphates and 11.36 organic matter and ammonical salts.

The *Cuban Guano* is in caves in the Island of Cuba, and contains 68.11 phosphate of lime, and nearly 10 per cent. organic matter.

The *Alta Vela Guano*, situated N. latitude 17° and 72° W. longitude, 18 miles from St. Domingo, contains 60 per cent. phosphate of lime.

The *Malden Island Guano* of the South Pacific Ocean contains 76 per cent. phosphate of lime and 14 per cent. organic matter.

[WRITTEN FOR THE AMERICAN JOURNAL OF MINING.]

THE CHEMICAL OPERATIONS.—III.

BY PROF. G. HINRICHS, OF THE IOWA STATE UNIVERSITY.

SOLUTION—CONTINUED.

19. *Solution of Gases.*—That also gases dissolve in water may be shown by means of the apparatus represented in Fig. —. [This figure is omitted, but the references in the text will sufficiently explain its nature—ED.] A flask, A, is completely filled with the liquid—say common water—which has previously absorbed all that it will retain in solution of some gas, say—atmospheric air. A cork stopper through which a bent glass tube passes, is pressed down on the liquid so that also the tube is completely filled with the liquid. The other end of the glass tube is immersed in the mercury of the vessel B, under the inverted glass receiver C, which at first is also completely filled with mercury. On the application of heat to the flask, A, the water will expand, and a part will pass over into C; at about 40° C, many gas-bubbles will appear in A, and also pass to C, collecting in the receiver above the water on the top of the mercury. By heating the water in A, until it boils, all the gas may be expelled from it. If now the volume of the water taken is known, and if the volume of the gas obtained is accurately measured, we can readily calculate how many volumes of gas 100 volumes of water held in solution; this number is the solubility of the gas in water. In the same manner the solubility of gases in other liquids is determined.

20. By a more refined method, of his own invention, BUNSEN of Heidelberg, has determined the solubility of several gases in water, and also in alcohol, at the common temperature of the air (15° C,) as follows:

Solubility.	In Water,	In Alcohol.
Atmospheric air.....	1.8	....
Nitrogen.....	1.5	12.1
Hydrogen.....	1.9	6.7
Oxygen.	2.9	28.4
Marsh gas.....	3.9	48.3
Carbon dioxide.....	100.2	319.3
Hydric sulphide.....	323.3	953.9
Sulphur dioxide.....	4356.0	14455.0
Ammonia.....	72720.0	.....

The nature of many of these gases is already known; in the following chapters of this work they will be more carefully studied. But we see here how widely gases differ in regard to their solubility in water. While 100 volumes (cubic centimeters for example) dissolve only about 2 volumes of common air, they absorb 72,720 volumes, or 36,360 times as much of ammonia. It will likewise be seen that the solubility depends upon the solvent also; thus, alcohol dissolves of many gases 10 times as much as water.

21. From what has been said, it is already plain that the solubility of gases in liquids decreases, while that of solids, on the contrary, increases, with the increase of temperature. Boiling a liquid expels *all* the gas which it may have held in solution. If, therefore, we wish to prepare a solution of any gas, we must keep the temperature of the solvent as low as possible.

22. By exposure of the gas confined above a liquid to greater pressure, a greater quantity of the gas will be absorbed. The *volume* of gas absorbed *remains the same for all pressures;* hence, according to MARIOTTE'S law, the *weight* of the gas dissolved by the liquid *is directly proportional to the pressure.* We can therefore also remove the gas from a solution by exposing it to a vaccum. A glass of common well water gives off many bubbles of air when placed under the receiver of an air-pump.

This law is made use of in the manufacture of artificial mineral waters. By applying the pressure of six or more atmospheres, the amount of gases (by weight) dissolved by these waters is very much increased. When mineral waters, containing gases, come from great depths to the surface, they usually foam, because under the lower pressure at the earth's surface they cannot retain the gas dissolved under higher pressure in depth.

23. Several liquids in common use are merely solutions of gases in water. Hydrochloric or muriatic acid is hydrichloride gas dissolved in water. Ammonia (*Aqua ammonia* of the shops) is also a solution of ammoniacal gas in water.

24. For the convenient handling of gases, vessels like B and C, (fig. 2, above described) are always used. The vessel B is called a pneumatic trough, and is the invention of the English Chemist, CAVENDISH. If the gas operated upon is insoluble or only slightly soluble in water, water is used instead of mercury. In this case the apparatus need not be so strong and is best constructed of glass plates. Fig. —[This, like the previous figure, is omitted. But the description in the text sufficiently explains it—ED.] The support for the inverted receiver is called the bridge, and is usually perforated for the passage of the gas. By simply blowing through the tube *a*, the collection of gases in this manner may be readily illustrated. The breath ascends into the receiver and collects above the water, the surface of which gradually sinks toward that of the water in the trough. This apparatus has been, and will continue to be frequently employed, and its influence has been important in the developments of modern chemistry.

25. When one liquid is added to another, they either do, or do not, mix. Thus water, and alcohol mix with one another, and are said to be *miscible.* It is not correct to say that alcohol dissolves in water. Oil and mercury are not miscible with water.

II. CRYSTALLIZATION.

26. One hundred grammes of water at 100° C, (the boiling point) dissolve 78 grammes of alum; at 20° C, the same amount of water can only contain 7 grammes of alum (see paragraph 13, under *Solution*). If, therefore, the hot, saturated solution be cooled down from 100° to 20°, 71 grammes of alum will separate in solid form, and if the cooling takes place very slowly and gradually, the atoms will arrange themselves in certain regular shapes, forming *crystals.* In like manner, if a saturated solution of 100° be cooled to 20°, 214 grammes of nitre will separate in crystalline form from each 100 grammes of water, since the solubility of nitre at 100° is 248, and at 20° only 34. This separation of the solid in peculiar definite and regular form from the solution is one mode of crystallization, or crystallization *by cooling* (in the wet way.)

27. But some solids, *e. g.*, common salt, are almost equally soluble at higher and lower temperatures. By cooling a solution of salt from 100° to 20°, only 4 grammes of salt are separated per 100 grammes of water. Such substances cannot well be crystallized by mere cooling of their solutions, but their crystallization is readily effected when the solvent is gradually removed by slow evaporation, at common temperatures. A saturated solution of common salt, exposed to the air, will in a few days deposit a fine crop of cubical crystals. In the employment of this process of crystallization by slow evaporation, inconvenience is sometimes caused by a sort of creeping of the substance over the margin of the vessel. This may be prevented by a thin coatinfi of beeswax or grease around the rim.

[WRITTEN FOR THE AMERICAN JOURNAL OF MINING.]

REPORT OF EXPLORATIONS ON THE GOLD FIELDS OF VIRGINIA AND NORTH CAROLINA.

BY DR. H. CREDNER.

VII.

DESCRIPTION OF INDIVIDUAL MINES, ETC., CONTINUED.

49. TOLER'S *Property*, of three hundred acres, lies directly west of LANCELOT MARK'S. Three quartz veins have been opened here. The first, nearest the road, is of great thickness, but inferior quality. A second parallel one, which has been worked to some extent by a shaft 42 feet deep, and also by open pits, yields very fair ore, and still a third parallel vein carries quartz of very excellent character. It is full of oxide of iron, and contains gold in visible particles.

A great number of quartz boulders, showing free gold, cover the top and the slopes of the ridge, whilst the low parts of the estate carry gold placers, which have formerly been extensively and successfully worked. The supply of wood and water is sufficient for mining and milling purposes. This property can be recommended as a promising mining field, and more especially so if it could be worked in combination with the neighboring one of LANCELOT MARK.

50. WM. B. DUKE'S *Property*, directly southwest of MARK'S, has an area of 290 acres. It is traversed by a vein of iron pyrites, the outcropping of which is converted into oxide of iron. Rich surface washings have been carried on here.

51. MARSHALL E. F. ADMORE'S *Property*, northwest of DUKE'S, contains 170 acres. A small but rich vein has been opened, which yields fine specimens.

52. PACE'S *Property.* A vein was opened in 1831 by sinking a shaft 31 feet deep. The country-rock is a bluish clay slate, which bears small seams of highly ferruginous and auriferous quartz.

53. BENJ. JOHNSON'S *Property*, northwest of PACE'S property, has an area of 300 acres. A shaft of 30 feet depth has developed an auriferous quartz vein of fair character. All the openings are caved in. A small brook runs through the property. Wood is plentifully supplied.

54. TYLER'S *Property*, 60 acres, lies southwest of JOHNSON'S and northwest of PACE'S, and directly between them, and contains, therefore, the continuations of the veins, which were opened on both these properties.

55. JAMES L. KENT'S *Property*, in Fluvana County, contains 80 acres, one and a half miles distant from TYLER'S. White Hall Road, at the nearest point one mile from Goochland Court House, leads through the property. A series of cuts and pits have been opened on the course of a vein, which is said to be rich in gold. There is, aside from one spring, no water on this farm.

56. LEMUEL MARK'S *Property*, Fluvana County, has an area of 153 acres. A brook furnishes a large supply of water. A vein is opened by a shaft of 18 feet depth; the ore on the dump looks poor. Old diggings, which are said to have been rich, line the brook. All the openings are now caved in and overgrown.

57. WM. MOSBY'S *Property*, directly northwest of MARK'S, has an area of about 300 acres. Besides the three veins described under No. 22, and known as the "Big Sandy," the "Middle" and the "Tellurium vein," the continuation of which can be traced on this ground for 350 yards, there is another vein, which has yielded good ore. On both sides of the creek, which has water enough to furnish power for a small mill, the alluvium has formerly been washed for gold.

58. JAMES SHEPARD'S *Widow's Property*, southeast of MOSBY'S, comprises 250 acres. A quartz vein, which has been opened on the neighboring farm of BARTLETT by a series of shallow pits, crosses this property also. The outcrop indicates rich ore.

59. W. S. FOUNTAIN'S *Property*, southwest of MOSBY'S, and MOORE'S, contains 600 acres. Two mounds of diorite appear on this property, but the stratification of the prevailing slates does not seem to have been disturbed by them, so that the continuation of the "Big Sandy vein" on its true course can be traced across the tract. It was opened in 1837 by G. FISHER. MARKS' vein has also been opened and worked to some extent. Some of the ore of this vein has been crushed in a small three-stamp mill on Horsepen Creek, and yielded $75 per day. The ore left on the dumps is of good character.

60. W. R. COCKE'S *Property*, directly southwest of FOUNTAIN'S, contains 570 acres of land, and lies on the eastern bank of "Big Bird Creek." Alluvial beds of auriferous sand and gravel are known in the northeastern part of the property. The continuations of the "Big Sandy Vein," and the outcrops of another vein, supposed to be the "Tellurium," crosses the lands to the extent of two miles.

61. GEORGE PACE'S *Property*, Fluvana County, one mile west of Wilmington, contains 80 acres of land, and is situated on "Long Island Creek." Two quartz veins, carrying fine-grained galena and gold, have been opened by several tunnel sand shafts, and the ores therefrom worked in a small mill, of which the ruins only remain. A vein of hematite, two and a half or three feet in thickness, crops out near the side of the former mill. As all the openings are caved in, few observations only could be made.

62. WM. M. SHEPHERD'S *Property*, directly west of the foregoing, contains 100 acres of land. Well-paying surface-washings have been carried on on both sides of the creek; a broken down dam remains from these works. Two small veins of white-fine-grained quartz, carrying free gold, have been opened by tunnels and shafts in several places. These veins are favorably situated for mining purposes, since they can be worked to considerable depth by tunnels from the level of Long Island Creek.

63. DAVID FERRAR'S *Property*, northwest of SHEPARD'S, contains 100 acres of land, which are crossed by Long Island Creek. Gold nuggets, worth $20 to $25, have been

found in the alluvial sand beds of this tract, and surface washings are still carried on. Boulders and the gravel in the creek indicate the existence of a deposit of copper ore.

64. GOOCH & DANIEL'S *Mine*, situated on a tract of 700 acres, north-northwest and northeast of PACE and SHEPARD. Surface washings have formerly been carried on along the banks of a small branch, which is a tributary of Long Island Creek. On the hill-top is the mouth of an incline, by which a series of lenticular quartz concretions was opened. A tunnel was also driven from the hillside in the direction of these deposits, but is now caved in. The ore is a very hard, sandy quartz, carrying free gold in minute particles. Another quartz lode, nearly sixty feet wide, was opened by costeaning pits, but the ore it yielded was very poor.

Scientific Meetings.

POLYTECHNIC BRANCH OF THE AMERICAN INSTITUTE.

THE IMPORTANCE OF THE MINERAL, APETITE, IN DOMESTIC ECONOMY—PHOSPHORUS, MEANS FOR CROSSING FROM NEW YORK TO BROOKLYN.

The regular weekly meeting of the Polytechnic Branch of the American Institute was held on Thursday evening, Jan. 14—Professor TILLMAN in the chair.

After the chairman had read a number of scientific items, which elicited some discussion, Dr. FEUCHTWANGER read a paper, or the ineral, apatite, and its importance in domestic economy. After stating that apatite was a mineral phosphate of lime, similar in character to the bones of animals, the uses of both bones and apatite were noticed as employed by the agriculturist. The latter mineral can also be employed for the production of phosphorus which is imported from Germany and France, to the amount of $100,000 per annum. Coprolites were noticed as being used solely for making superphosphate of lime, while apatite bids fair to compete with other substances in the manufacture of various chemical compounds. The various guano producing localities were referred to, and their products contrasted with apatite as fertilizers. In the discussion that followed the reading of the article, it was mentioned that the amount of phosphorus used in the United States was quite large, and yet it was believed that not a pound, or even half a pound, had been made in this country for several years. It was thought that it might be made here with a good profit, and the greatest difficulty to be experienced would be the want of proper crucibles, which would have to be imported from Europe.

Following the reading and discussion of the paper, was brought up the subject of a bridge between New York City and Brooklyn. Some new means of communication were advanced which evidently had the merit of novelty. In addition to bridge and tunnels, it was proposed to build a huge boat, about a thousand feet long, made to run in a proper track, and on the deck of this boat place cars, so that the passengers could be journeying onward in the cars, while the short distance that the boat had to traverse was being accomplished. The subject of filling in with earth the space between New York and Brooklyn was discussed, and by some deemed a necessity, while others thought that if it was done, no means of sewerage for a portion of the city be obtained.

After somewhat late hour the meeting adjourned for one week.

LECTURES BEFORE THE AMERICAN INSTITUTE

PRIMEVAL CHEMISTRY.

The eighth of these lectures before the American Institute was given in Steinway Hall on the evening of Jan. 13, by Dr. T. STERRY HUNT, Montreal Canada, the subject being "Primeval Chemistry."

After some few remarks on the various theories which learned geologists have propounded in regard to the manner in which the earth assumed her present appearance, the doctor spoke of the mistakes to which even the most scientific of men are sometimes exposed, and believed in the nebular hypothesis, and that in these nebulous masses there was hid cosmic matter. Subsequent discoveries disclosed the nebulæ to be, like the milky way, a group of stars, a mass of solid bodies, only surrounded by vapors. The Doctor then, drawing conclusions from the appearance of the luminous bodies in the sky, as they are reflected in the spectroscope, came to the condensation of vapors around our own globe. The hardened crust was evidently produced by cooling. At a certain temperature all bodies possess what was called, "chemical indifference." But to reach that, the body of the earth must have had a higher degree of luminousness; it must have been self-luminous, like the sun. From time to time the earthly oxydes in the vapors were decomposed and the cooling began. But the supposition of a consolidation of matter at the surface was erroneus, as was the idea of a liquid nucleus of the earth. This idea was taken from water, which freezes first at the surface; but, in reality, the formation of the earth by the cooling process began first in the centre. The speaker continued this elucidation for some time, stating many chemical experiments from which the theory of the cooling of the earth's crust as advanced by him may be proven. The fallacy that granite was a kind of primitive rock he showed up by a chemical analysis of granite. The abrasions by the winds and oceanic currents were explained and the sedimentary deposits spoken of as instrumental in forming the present physiognomy of the earth. The doctor spoke at length of the volcanic phenomena and of the influence exerted by heat and water upon deeply-buried sediments near the centre of the earth. Metalliferous deposits, as products of the chemistry of the globe, were referred to, and the lecturer closed with a description of the causes of eruptive rocks and dynamic movements of the surface of the globe. The lecture was loudly applauded.

Geology of Illinois.

The Illinois State Geological Survey has been finished, and the third volume of the report issued. The following facts are taken from an abstract of the report given by a correspondent of the St. Louis *Democrat:* "There are within the State, exclusive of several thinner beds and seams, six workable strata of good coal underlying large areas. These heavy beds vary in thickness from two to nine feet, and amount in the aggregate to about twenty-six feet of solid coal, in various parts of the State, all, or a portion of these thicker beds, owing to the slight inclination of the strata, or sometimes to the excavation of valleys, crop out, or come so near the surface that they can be readily mined by horizontal or slightly inclined drifts or subterranean excavations; while they all, or in some places a portion of them, underlie extensive areas in the central region of the State, where they can be reached by vertical shafts at various depths, of from thirty or forty to from two hundred to five hundred feet, and then followed in any direction indefinitely. All of these workable beds, that is those of sufficient thickness to be extensively mined, belong to the lower division of the coal measures. There are, however, several thinner seams, varying from about two inches to a few feet in thickness in upper member of the series. These, though two thin for mining on a large scale, are, nevertheless, of considerable value for the supply of local demand, as they may often be made to yield large quantities of good coal when they lie so near the surface as to be accessible by open pits. The geologist estimates the amount of coal raised from the mines in Illinois during the year 1867 at 1,500,000 tons, and thinks that the yield for 1868 must be largely beyond that of its predecessor. The first chapter of the report closes with some remarks on the Hardin county lead mines, giving some additional facts respecting the progress of operations at these mines since the detailed report on them, published in the first volume, was prepared. These mines seem to be now successfully worked, and are not only producing considerable quantities of lead ore, but much of the associated fluor spar, for which they find a ready market. Jackson county, in its northwestern portion, is underlaid by at least three beds of coal, one of which—at Murfreesboro—furnishes a coal pure enough to be used in the raw (uncoked) state in smelting iron ores. Perry County lies entirely within the coal region, and one of the main seams, six feet or more in thickness, appears to underlie the whole county. In Washington, Clinton, Marion and Jefferson the coal measures are extensively developed. The counties lying along the eastern side of the Illinois River have a fine soil, plenty of building stone and various other natural resources, including some coal; but lying as they do just on the western borders of the coal fields, the supply is not as abundant as in some of the other counties. Of the northern counties (Lasalle and Cook), the former has a large supply of valuable coal, there being three workable beds extending under much of its area, and lying as it does at the northern borders of the coal fields, with extraordinary facilities for transportation by river, canal and railroads, it has great advantages for successful mining operations. There is also in this county an inexhaustible supply of very pure firesand, admirably adapted to the manufacture of the finest quality of glass. Extensive beds of hydraulic limestone also occur in this county, from which cement in any desired quantity can be cheaply manufactured. There are already not less than sixty thousand (60,600) barrels of this cement annually manufactured here. Cook County has no coal, but can be cheaply supplied from some of the neighboring counties on the south. It contains some peat, a large supply of good limestone for the manufacture of quick lime, and some good building stone, as well as excellent soil. Much of the remaining portion of the report is devoted to palæontology. Among the many other curious extinct animals are some very remarkable articulates from the coal measures near Morris, Grundy County. Of these are a horse-shoe crab, several shrimp-like crustaceans, and two species of scorpion; also portions of an enormous centipede, supposed to have been from twelve to fifteen inches in length; likewise a spider, a cockroach, and various other insects."

Canadian Oil.

Says the Toronto *Monetary Times*, Jan. 7:—"Despite the prophecies of the nervous, and the loudly expressed fears of the timid, that portion of our business community known as the 'Oilmen' still cherish faith in the future of oil, and are little disposed to relax their efforts to put the oil trade of Canada on a proper footing. During the first six months of the year the production at the refineries was largely in excess of the wants of the home market. In fact, the competition among refiners was ruinous, and a stock of 50,090 barrels accumulated on their hands. The price of oil opened at 15 cents per gallon, and went as low as 10 cents. The Higgins scheme was a happy hit. A combination was entered into, to extend from July to January, the refineries were leased, 3,000 barrels, at an average price of 18 cents, were bought up with Canada capital, and no oil was produced, except for export. The effect was that the oil went up in price, and holders, not in the combination, received a benefit of a rise to 35 cents a gallon. The export to Liverpool during the season was 6,000 barrels; part of which was sold at satisfactory prices. The Canada Land and Mineral Company shipped 3,000 barrels. It has a still capacity for manufacturing 2,500 barrels per week. The beneficial results of the first combination suggested continued joint action, and the Oil Refiners Association of Canada was formed, whose operations will date from the 1st of January. The terms of agreement are pretty much the same as before. Prices have been fixed, for one to five carloads, at 35 cents per gallon in London, Ontario; five carloads, and upwards, 32 1-2 cents, cash on delivery. The well owners have also formed an association, which embraces in the membership the owners of producing wells in Petrolia. They purpose to sell only to the Refiners' Association; to limit the proportion to the actual needs of the country, and to give every possible encouragement to the export trade.

Iron in Michigan.

Mr. LURMANN'S improvement in blast furnaces, which was introduced to the public through the JOURNAL OF MINING some time ago, is, we are glad to learn, about to be tested by the enterprising "Pioneer" Company of Lake Superior. The Marquette *Mining Journal*, Dec. 30, says, speaking of the Pioneer Furnace:—"No. 2 blowed out a fortnight ago, for a new hearth of Lurmann's patent. This hearth, which was patented in this country only about a year ago, is claimed to be a great improvement over the inconvenient method of working with tymp and forehearth. It has been adopted by a great many of the furnaces in the Middle and Eastern States, but the Pioneer is the first to adopt it here. Those who have tried the Lurmann improvement assert that the production of iron is increased from 15 to 40 per cent., a saving of from 10 to 20 per cent. in fuel is effected, while the product is improved in quality and uniformity. Should these promises be realized by the owners of the Pioneer, the new hearth will, no doubt, be adopted at all the other furnaces in the district."....Of the Deer Lake Furnace our cotemporary says:—"This new furnace, which has been in operation since the first week in September last, is answering the most sanguine expectations of her owners. About six hundred tons of iron were sent to market before the close of navigation. The daily make is from eight to ten tons, for six days in the week."....Speaking of the Barnum mine the *Journal* says:—"The Barnum mine was opened last winter, though active mining operations did not commence until last spring. This mine is contiguous to the Lake Superior, and is reached by a branch of the C. & N. W. R., which was completed and put in operation some time in June last. Since then the shipments aggregate 14,380 gross tons, the largest figures ever achieved by any of our mines in the first year. The mine is under the immediate supervision of Capt. Jas. G. Gray, an experienced miner, to whose energy the company is largely indebted for this very gratifying result of the season's work. Capt. Gray informs us that the mine is now in excellent condition for working, and that the figures for the season just closed are but a slight indication of those to come hereafter."

Value of European Patents.

The American origin of an invention is now a recommendation in Europe, where many of these inventions are in successful operation and large fortuness have been realized by their introduction. Improvements relating to some manufactures are of great value in this kingdom. Mr. Bessemer derives an annual income of about $2,000,000 from his British steel patents, and the patentee of a device for dressing millstones by a revolving diamond, has realized over $1,000,000 the first year of his patent. The use of a diamond for this purpose is an American invention, and the estimated value of the exclusive right in England, for ten years, is $5,000,000. British patents, as a rule, are the most valuable, but many inventions are equally profitable in other parts of Europe, and some are peculiarly adapted to Continental wants and customs.—*Hazeltine, Lake & Co.'s Circular.*

POWER OF A GROWING TREE.—Walton Hall, England had at one time its own corn mill, and when that inconvenient necessity no longer existed, the mill stone was laid by in an orchard and forgotten. The diameter of this circular stone measured five feet and a half, while its depth averaged seven inches throughout; its center hole had a diameter of eleven inches. By mere accident, some bird or squirrel had dropped the fruit of the filbert tree through the hole on the earth, and in 1812, the seedling was seen rising up through that unwonted channel. As its trunk gradually grew through this aperture and increased, its power to raise the ponderous mass of stone was speculated on by many. Would the filbert tree die in the attempt? Would it burst the millstone? or would it lift it up? In the end, the little tree lifted the millstone, and in 1863 wore it like a crinoline about its trunk; and Mr. Waterton use to sit upon it under the branching shade. *The Prarie Farmer.*—Chicago, Ill.

INDIA RUBBER SPONGES.—A new European invention is an imitation of sponge made from India rubber. The imitation is stated to be perfect in appearance, but much softer than the real sponge, and its power of absortion, owing to its elastic quality, is said to be much greater. So far as experiments with this article have been made, they indicate much greater durability than belongs to the natural sponge, and the prospects are that it will be in large request for surgeon's use and the bath. It has the advantage of being shaped into any required form without loss, and its softness is not impared by the process. This will give it importance in surgery, where a delicate article is very desirable.

Special Notices.

One of Marvin's Safes.

We understand that when the beautiful marble block on Chestnut street, above Ninth, in Philadelphia, was burned on the 14 inst., that one of Marvin's celebrated safes was among others in the building, and furthermore, when this safe was dug from the ruins, that the costly jewelry and articles of *bijouterie*, were taken from it in an uninjured condition. From the severe ordeals through which Marvin's safes have passed at different times, and their capability to retain books, jewelry and other commodities uninjured, while subjected to great heat, is certainly worthy of universal approbation.

In our advertising columns will be found the advertisement of mineral lands for sale near Staunton, Va., by our well known and much esteemed correspondent, Mr. R. P. Rothwell, of Wilkesbarre, Pa. We believe the lands are as valuable and as rich in ore as the brief description implies.

Patent List.

Interesting to Miners, Millmen, Metallurgists, Oil-Men, and Others.

85,570.—MEANS FOR REPAIRING BLOWING ENGINES.—Thomas Critchlow, Swatara Township, Pa.

85,520.—APPARATUS FOR MAKING WIRE OF SHEET METAL.—Thaddeus Fowler, Seymour, Conn.

85,576.—MANUFACTURE OF GUNPOWDER.—Louis Henry Gustavus Ehrhardt, London, England. Assignor to George B. Upton, David D. Stackpole, and Samuel H. Gookin.

85,597—SUBAQUEOUS DRILLING MACHINE.—Samuel Lewis, Brooklyn, E. D., New York.

85,663.—HYDROCARBON BURNER.—Samuel A. Hill, Oil City. Assignor to himself and Chas. F. Thumm and Oliver P. Scaife, Pittsburgh, Pa.

85,665.—MACHINE FOR CUTTING NAILS.—Cyrus D. Hunt, Fairhaven, Mass.

85,700.—MACHINE FOR SEPARATING AND CONCENTRATING MAGNETIC AND OTHER ORES.—Edward L. Seymour, New York, N. Y.

85,701.—FURNACE FOR PRODUCING STEEL AND OTHER METALS.—Edward L. Seymour, New York City.

85,713.—COMPOSITION FOR ARTIFICIAL STONE.—Edward Mestermayr, Chicago, Ill.

RE-ISSUES.

41,924.—BOLT MAKING MACHINE.—Dated March 15, 1864; Reissue, 3,251.—William T. Lewis, Pittsburgh, Pa.

75,809.—PROCESS OF REMOVING TIN FROM SHEET METAL.—Dated March 24, 1868; Re-issue, 3,258.—D. B. Sturdevant and H. B. Harman, Clifton Springs, N. Y.

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I offer this superior Coal to Gas Companies throughout the United States—*superior to any*. An analysis by Engineer Manhattan Gas Light Co. of New York, gave: Volatile matter, 37.0; fixed carbon, 59.0; ash, 4.0—100.0. The maximum yield of gas per ton of 2240 lbs was 9,681 feet. When the yield was restricted to 9,500 feet, the illuminating power of the gas was equal to 19.50 candles. The yield of coke was 40 bushels, weighing 1,500 lbs. One bushel of the hydrate of lime purified 4,180 feet of gas. Orders solicited from Gas Companies, Gas Manufacturers, and Shippers of Coal by the Cargo. nov28-6m

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ANNUAL MINING REPORT.

ADELBERG GOLD COMPANY—ANNUAL REPORT.—The amount of the Capital Stock of the said Company is FIVE HUNDRED THOUSAND DOLLARS, par value. The whole of which has been issued in payment for lands, mines and other property of the Company. The amount of the present debts of the Company does not exceed Three Thousand Dollars.

E. W. RAYMOND, President.
LEVIN PALMER, } Majority of the
A. H. SCOVILLE, } Trustees.

CITY AND COUNTY OF NEW YORK, ss.

LEVIN PALMER, being duly sworn, says that he is the Secretary of the Adelberg Gold Company, and that the above report is true.

LEVIN PALMER, Secretary.

Sworn to before me, this 14th day of January, 1869.

W. G. LATHROP, Jr.,
Notary Public.

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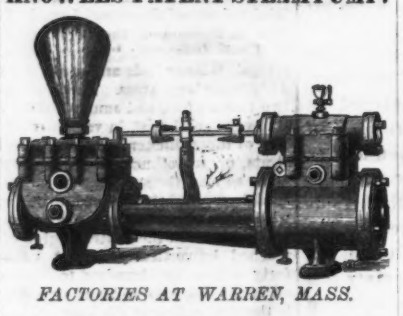
KNOWLES' PATENT STEAM PUMP.



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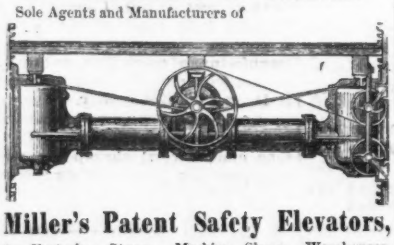

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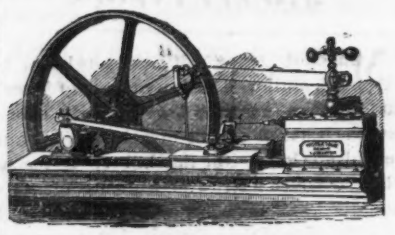

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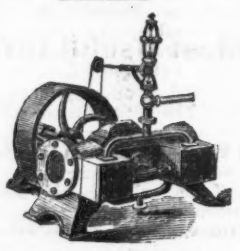

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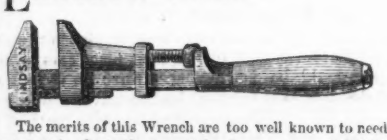

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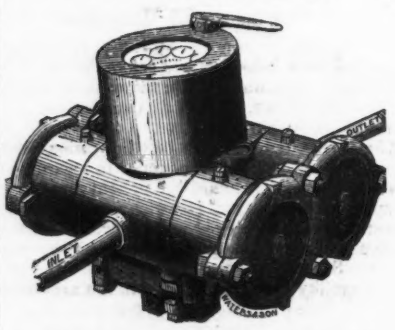

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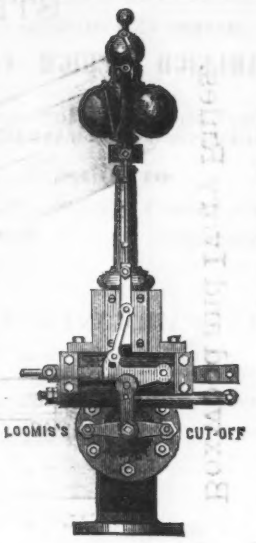

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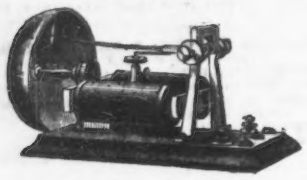

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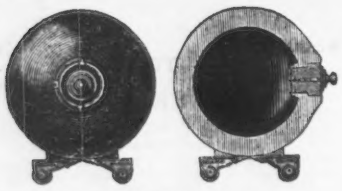

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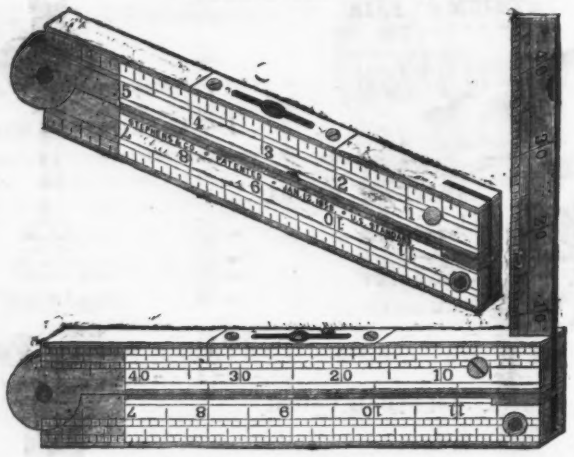

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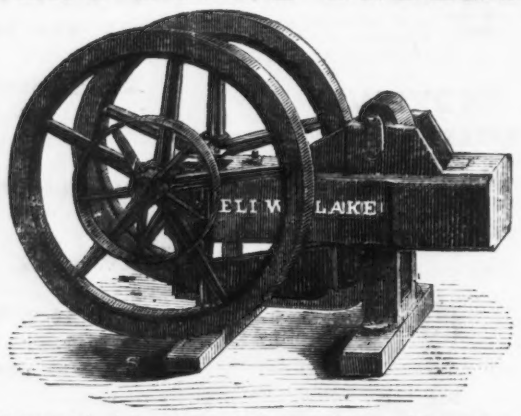

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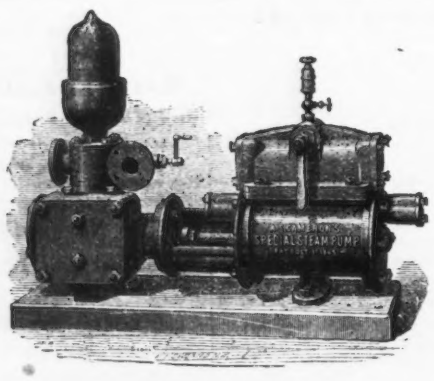

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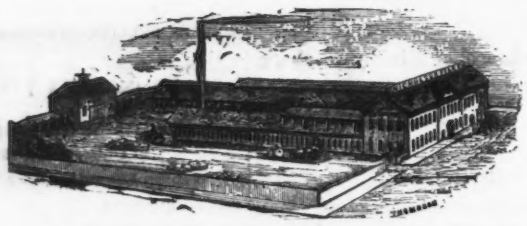

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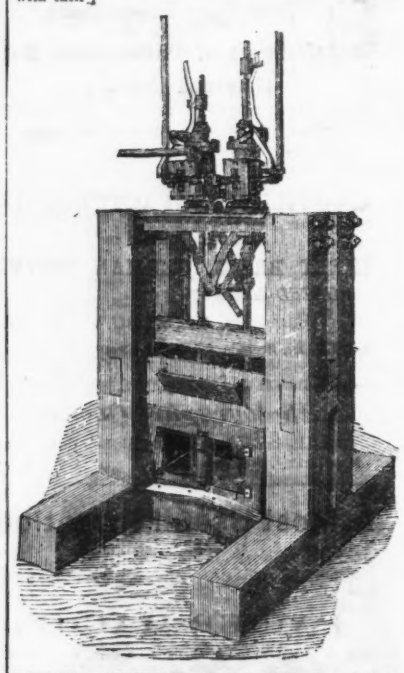

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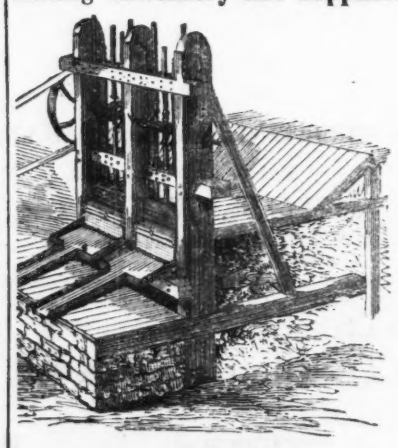

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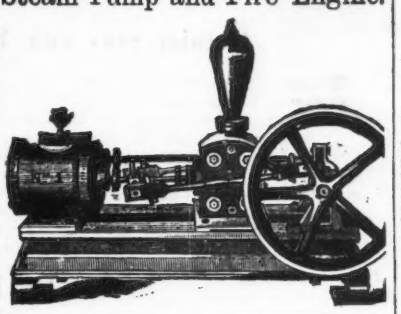

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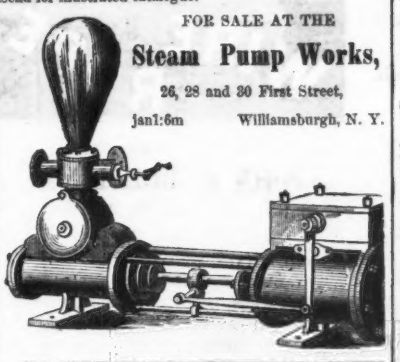

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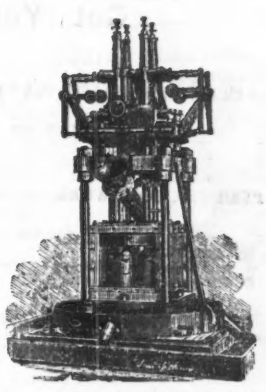

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